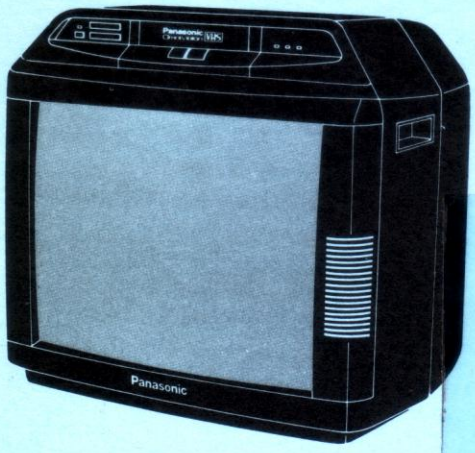
ORDER NO. MKE9106M385
B6

Service Manual

CONBINATION-VCR

Panasonic Omnivision VHS



Model : PV-M2021

PV-M2021

⚠ WARNING

This service literature is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product. Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service literature by anyone else could result in serious injury or death.

ITEM		SPECIFICATION	1
VCR	Video	Head : 2 rotary heads helical scanning system	○
		Input Level : VIDEO IN Jack (Phono type) 1.0 Vp-p 75 Ω unbalanced Signal-to-Noise Ratio : SP : more than 43dB LP/SLP : more than 41dB Horizontal Resolution : Color/Monochrome : more than 230 lines	○
	Audio	Head : Normal Mono : 1 stationary head	○
		Input Level : AUDIO IN Jack (Phono type) – 10dB 50k Ω unbalanced	○
		Frequency Response : Normal Mono : SP : 100Hz ~ 8kHz LP : 100Hz ~ 6kHz SLP : 100Hz ~ 5kHz	○
		Signal-to-Noise Ratio : Normal Mono : SP : more than 42dB LP/SLP : more than 40dB	○
		Wow and Flutter : Normal Mono : SP : Less than 0.2% WRMS LP : Less than 0.3% WRMS SLP : Less than 0.4% WRMS	○
	Tuner	Broadcast Channels : VHF 2 ~ 13, UHF 14 ~ 69 CATV Channels : Midband A through I (14 ~ 22) Superband J through W (23 ~ 36) Hyperband AA ~ BBB (37 ~ 64) Lowband A-5 ~ A-1 (95 ~ 99) Special CATV channel 5A (01) Ultraband 65 ~ 94	○
	Tape Speed	SP : 1-5/16 i.p.s (33.35mm/sec), LP : 21/32 i.p.s (16.67mm/sec), SLP : 7/16 i.p.s (11.12mm/sec) Record /Playback Time : 8 Hrs with 160min. type tape used in SLP mode FF/REW Time : Less 5min.(120min. type tape)	○
	Tape Format	Tape width 1/2" (12.7mm) high density tape	○

1. PV-M2021

Specifications are subject to change without notice.

(Please see reverse side)

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(Continued from cover page)

ITEM		SPECIFICATION	1
DISPLAY	Picture Tube	20 inch measured diagonal 90° deflection	○
GENERAL	Power	Source : 120V AC ± 10 % 60Hz ± 0.5 %	○
		Consumption : 112 watts	○
	Television System	EIA Standard (525 lines, 60 fields) NTSC Color Signal	○
	Operating Condition	41° F (5 ℃) ~104° F (40 ℃) (Temperature) 10 % ~ 75 % (Humidity)	○
	Dimension	21-5/8" (550mm) (W) × 19-14/16" (506mm) (H) × 18-3/4" (476mm) (D)	○
	Weight	Approx. 57lbs (26kg)	○

1. PV-M2021

Weight and dimensions shown are approximate.

Specifications are subject to change without notice.

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ORDER NO. : MKE9106M385
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SECTION 1

MODEL NO.
PV – M2021

Summary
Adjustment Procedures
Schematic Diagrams
Exploded Views
Replacement Parts List

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IMPORTANT SAFETY NOTICE

There are special components used in this equipment which are important for safety. These parts are marked by ⚠ in the Schematic Diagrams, Exploded Views and Replacement Parts List. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent shock, fire or other hazards. Do not modify the original design without permission of manufacturer.

IMPORTANT SAFETY NOTICE

There are special components used in this equipment which are important for safety. These parts are marked by ⚠ in the Schematic Diagrams, Exploded Views and Replacement Parts List. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent X-RADIATION, shock, fire, or other hazards. Do not modify the original design without permission of manufacturer.

SAFETY PRECAUTIONS

GENERAL GUIDELINES

1. It is advisable to insert an isolation transformer in the AC supply before servicing.
2. When servicing, observe the original lead dress, especialiy the lead dress in the high voltage circuits. If a short circuit is found, replace all parts which have been overheated or damaged by the short circuit.
3. After servicing, see to it that all the protective devices such as insulation barriers, insulation papers, shield, and isolation R - C combinations are properly installed,
4. Before turning the receiver on, measure the resistance between B+ line and chassis ground. Connect (-) side of an ohmmeter to the B+ lines, and (+) side to chassis ground. Each line should have more resistance than specified, as follows :

B+ Line	Minimum Resistance	
130V	1K ohm	(Hot chassis ground)
27V	180 ohms	(Cold chassis ground)
17V	110 ohms	(Cold chassis ground)

5. When the TV set is not used for a long period of time, unplug the power cord from the AC outlet.
6. Potentials, as high as 30.0KV are present when this TV set is in operation. Operation of the TV set without the rear cover involves the danger of a shock hazard from the TV set power supply. Servicing should not be attempted by anyone who is not thoroughly familiar with the precautions necessary when working on high voltage equipment. Always discharge the anode of the picture tube to the CRT ground of receiver before handling the tube.
7. After servicing make the following leakage current checks to prevent the customer from being exposed to shock hazards.

LEAKAGE CURRENT COLD CHECK

1. Unplug the AC cord and connect a jumper between the two prongs on the plug.
2. For physically operated power switches, turn power on. Otherwise skip step 2.
3. Measure the resistance value, with an ohmmeter, between the jumpered AC plug and each exposed metallic cabinet part on the receiver, such as screwheads, connectors, etc. When the exposed metallic part has a return path to the chassis, the reading should be between 1 M ohm and 12 M ohms. When the exposed metal does not have a return path to the chassis, the reading must be ∞ .

LEAKAGE CURRENT HOT CHECK (See Figure 1)

1. Plug the AC cord directly into the AC outlet.
   Do not use a isolation transformer for this check.
2. Connect a 1.5K ohms, 10 watts resistor, in parallel with a 0.15 μ F capacitor, between each exposed metallic part on the set and a good earth ground such as a water pipe, as shown in Figure 1.
3. Use an AC voltmeter, with 1000 ohms/volt or more sensitivity, to measure the potential across the resistor.
4. Check each exposed metallic part, and measure the voltage at each point.
5. Reverse the AC plug in the AC outlet and repeat each of the above measurements.
6. The potential at any point should not exceed 0.75 volt RMS.
   A leakage current tester (Simpson Model 229 equivalent) may be used to make the hot checks, leakage current must not exceed 1/2 milliamp. In case a measurement is outside of the limits specified, there is a possibility of shock hazard, and the receiver should be repaired and rechecked before it is returned to the customer.

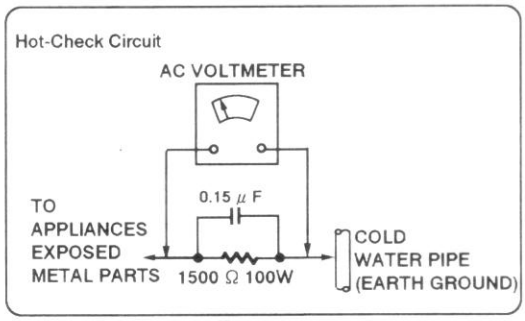


Figure 1

PREVENTION OF ELECTRO STATIC DISCHARGE (ESD) TO ELECTROSTATICALLY SENSITIVE (ES) DEVICES

Some semiconductor (solid state) devices can be damaged easily by static electricity. Such components commonly are called Electrostatically Sensitive (ES) Devices. Examples of typical ES devices are integrated circuits and some filed-effect transistors are semiconductor "chip" components. The following techniques should be used to help reduce the incidence of component damage caused by electro static discharge (ESD).

1. Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any ESD on your body touching a known earth ground. Alternatively, obtain and wear a commercially available discharging ESD wrist strap, which should be removed for potential shock reasons prior to applying power to the unit under test.
2. After removing an electrical assembly equipped with ES devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.
3. Use only a grounded-tip soldering iron to solder or unsolder ES devices.
4. Use only an anti-static solder removal device. Some solder removal devices not classified as "anti-static (ESD protected)" can generate electrical charge sufficient to damage ES devices.
5. Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ES devices.
6. Do not remove a replacement ES device from its protective package until immediately before you are ready to install it. (Most replacement ES devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive material).
7. Immediately before removing the protective material from the leads of a replacement ES device, touch the protective material to the chassis or circuit assembly into which the device will be installed.

CAUTION :
Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.

8. Minimize bodily motions when handling unpackaged replacement ES devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity (ESD) sufficient to damage an ES device).

"NOTE to CATV system installer :

This reminder is provided to call the CATV system installer's attention to Article 820-22 of the NEC that provides guidelines for proper grounding and, in particular, specifies that the cable ground shall be connected to the grounding system of the building, as close to the point of cable entry as practical."

X - RADIATION

WARNING :

1. The potential source of X-Radiation in TV sets is the High Voltage section and the picture tube.
2. When using a picture tube test jig for service, ensure that jig is capable of handling 30.0 KV without causing X - Radiation.

NOTE :
It is important to use an accurate periodically calibrated high voltage meter.

1. Turn the brightness control fully counterclockwise.
2. Set the SERVICE switch to SERVICE .
3. Measure the High Voltage. The meter reading should indicate 28.5 ± 1.5KV.
   If the meter indication is out of tolerance, immediate service and correction is required to prevent the possibility of premature component failure.
4. To prevent an X-Radiation possibly, it is essential to use the specified picture tube.

HORIZONTAL OSC. DISABLE CIRCUIT TEST

SERVICE WARNING :
The test must be made as a final check before set is returned to the customer.

1. With the rear cover removed, supply about a 130V AC power source to the set, turn on the set.
2. Set the customer controls to normal operating positions.
3. Short between TP91 and TP92 on the Main circuit board with a jumper wire. Confirm that the picture falls out of horizontal sync.
4. If this does not occurs, the horizontal oscillator disable circuit is not operating. Follow the Repair Procedures of Horizontal Oscillator Disable Circuit Repair Procedure before the set is returned to customer.

REPAIR PROCEDURES OF HORIZONTAL OSCILLATOR DISABLE CIRCUIT

1. Connect a DC voltmeter between capacitor C501 (+) on the Main circuit board and chassis ground.
2. If roushy +21.9V is not present at that point when 120V AC is applied, find the cause. Check R507, R509, R505, C501 and D503.
3. Connect a DC voltmeter between the emitter of Q502 on the Main circuit board and chassis ground. If nearly +12V is not present on that point, find the cause.
   Check 12V DC regulator and other components that effect this regulator.
4. Connect a DC voltmeter between the Base of Q512 on the main circuit board and chassis ground. Collector potential varies from nearly +0.58V to nearly +0.7V when 130V AC is applied while shorting TP91 and TP92. If this does not occur, find the cause. Check R541, R542, R540, R538, R537, R536, Q512,Q511,Q509,Q510,Q513, D514 and D510.
5. Carefully check above specified parts and related circuits and parts. When the circuit is repaired, try the Horizontal Oscillator Disable Circuit Test again.

CIRCUIT EXPLANATION

HORIZONTAL OSCILLATOR DISABLE CIRCUIT

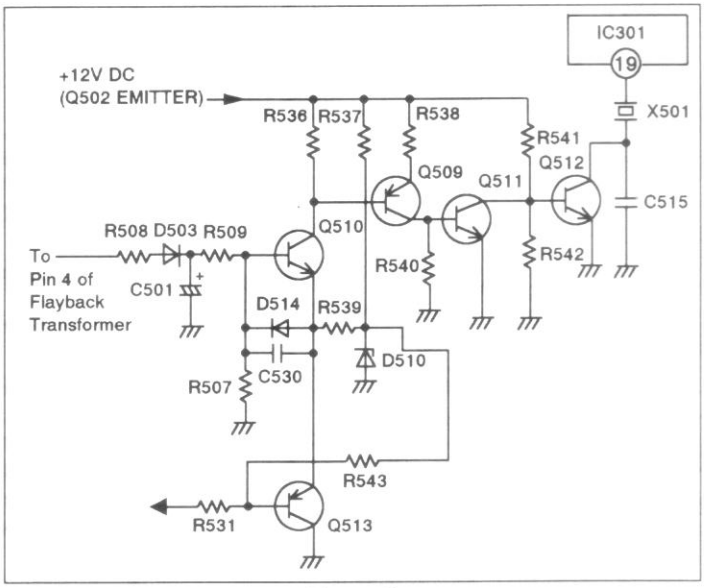
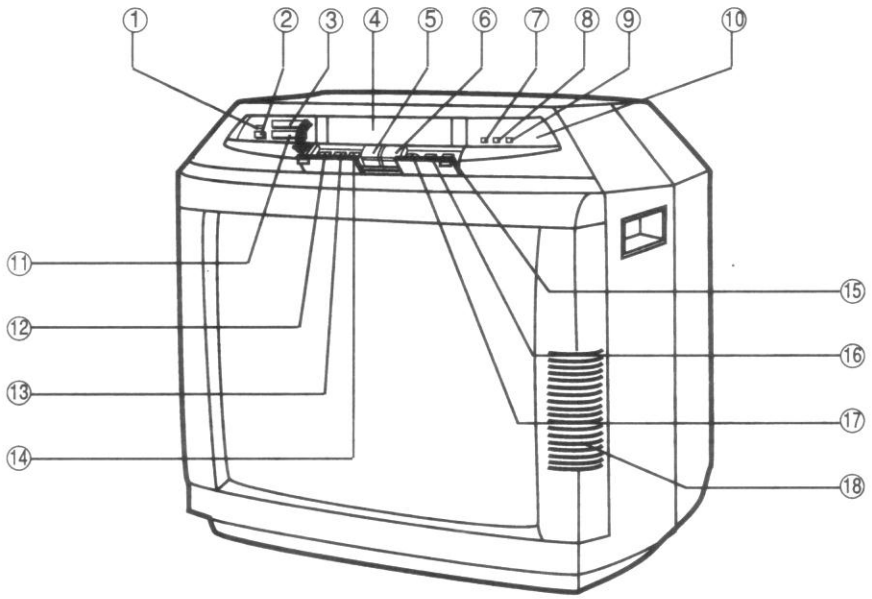


Figure 2

The positive DC voltage, is supplied from the cathode of D503 for monitoring the high voltage, is applied to the base of Q510 through R508 and R509. The voltage at the emitter of Q510 is regulated by Zener Diode D510. Under normal conditions, the voltage applied across the base and emitter of Q510 is not sufficient to cause base current to flow and holds the transistor cut off. If the high voltage increases over the specified voltage, the positive DC voltage which is supplied from the cathode of D503 also increases. The increased voltage applied to the base of Q510 causes base current to flow through Zener Diode D510. Consequently Q510 collector current begins to flow and the voltage at Q509, increases. This decrease the voltage at the collector of Q511 and prevent to supply the current to the base of Q512 through from power source then causes Q511 cut off. Therefore, C515 is connected to X501 then causes the horizontal oscillator frequency to increase and a lowering of the high voltage. Q513 affect to be change the point which X - Radiation safety circuit is operated according to increase or decrease of the beam current.

Description of Controls

Front



① **Power Indicator**
This indicator flashes when an operation button is pressed on the remote control.

② **Power Button**
To turn the monitor on and off.

③ **Volume Up/Down Buttons**
Press either the Volume Up or Down button to change the sound level from the built-in speaker.

④ **Cassette Compartment**
Where the video cassette is inserted.

⑤ **Stop/Eject Button**
To stop the tape. To remove a cassette in the stop mode.

⑥ **Play/X2 Button**
To play back a tape. In SLP playback, press this button once more for rapid search at twice the normal speed.

⑦ **Record Indicator**
This indicator lights during recording.

⑧ **Timer Indicator**
This indicator lights when the Combination VCR is set for unattended recording.

⑨ **Repeat Indicator**
This indicator lights when the repeat function is selected.

⑩ **Wireless Remote Sensor**
Receives the signal from the wireless remote control.

⑪ **Channel Up/Down Keys**
Used to select the desired VCR tuner channel. Can also be used to clear or reset items in a displayed program.

⑫ **Pause/Still Button**
To temporarily stop the tape during recording or to view a still picture during playback.

⑬ **Rewind/Search Button**
To rewind tapes. Also, during playback press this button to view the picture in rapid reverse.

⑭ **Fast Forward/Search Button**
To rapidly advance the tape. Also, during playback press this button to view a rapid forward search.

⑮ **Video/Normal Button**
Used to set all the Video Adjust control at a factory set level.

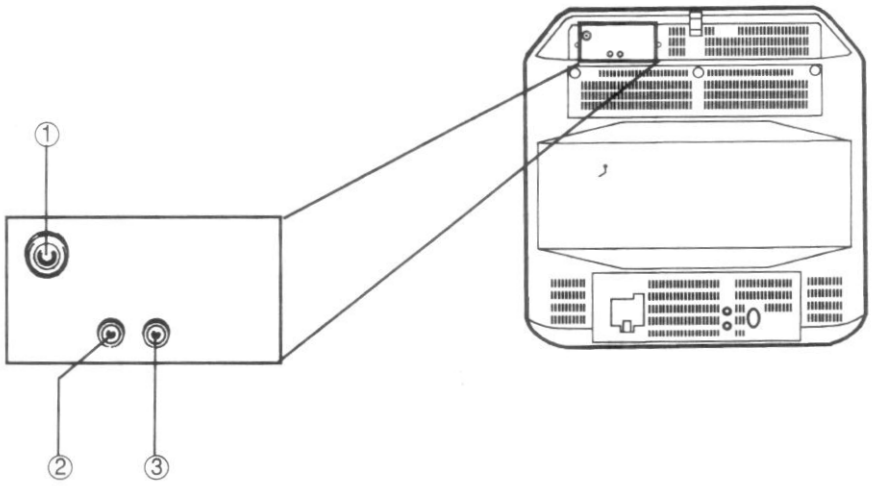
⑯ **Input Button**
Press this button for the desired input to the Combination VCR.
Tuner:For regular TV or Cable TV recording.
Line:For re-recording or camera recording.
"TUNER" or "LINE" will appear automatically for a few seconds on the TV screen when this button is pressed.

⑰ **Rec Button**
Press this button and Play button at the same time to begin a recording.

⑱ **Built-In Speaker**
Sound comes out here.

Description of Controls

Rear



① **VHF/UHF Antenna Input Terminal**
In from the Antenna or Cable.

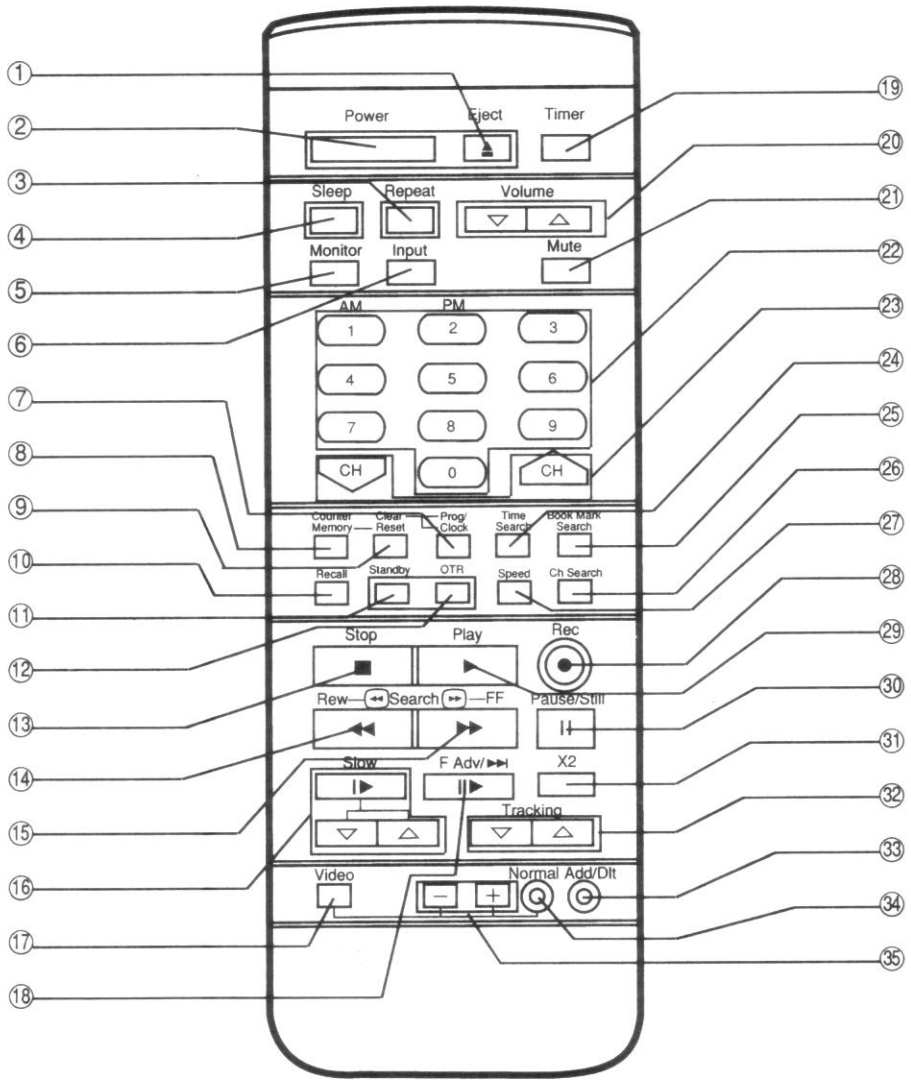
② **Video Input Connector**
For video input connection from another VCR or a portable video camera power supply.

③ **Audio Input Connector**
For connection from a portable video camera power supply, another VCR or the output connector of another audio source.

Description of Controls

TV/VCR Unified Remote Control

Most of the Combination VCR functions are conveniently controlled with your wireless remote control.



① **Eject Button**
To remove a cassette in the stop mode.

② **Power Button**
To turn the monitor on and off.

③ **Repeat Button**
Used to repeat playback of the continuously recorded portion of a tape.

④ **Sleep Timer Button**
Each press of this button advances the automatic off timer by 30 minutes (maximum is 90 minutes).

⑤ **Monitor Button**
During playback, press this button to display the TV channel currently tuned. Press again to resume playback from still mode.

⑥ **Input Button**
Press this button for the desired input to the Combination VCR.
Tuner: For regular TV or Cable TV recording.
Line: For re-recording or camera recording.
"TUNER" or "LINE" will appear automatically for a few seconds on the TV screen when this button is pressed.

⑦ **Prog/Clock Button**
Used for setting the clock, channel memory and timer recording.

Description of Controls

⑧ **Counter Memory Button**
Turns the memory stop feature on and off.

⑨ **Clear/Reset Button**
Clear button
Press this button to clear the setting for the displayed program contents.
Reset button
Resets the time counter when it is displayed.

⑩ **Recall Button**
Press this button to display or clear the time counter, date, time, function, and channel number.

⑪ **Standby Button**
Used along with the OTR button to set delayed (Standby) OTR's.

⑫ **One Touch Record (OTR) Button**
Select the channel and press the One Touch Record button to start an immediate recording 30 minutes to 4 hours long, or up to the tape end.

⑬ **Stop Button**
To stop the tape.

⑭ **Rewind/Search Button**
To rewind tapes. Also, during playback press this button to view the picture in rapid reverse.

⑮ **Fast Forward/Search Button**
To rapidly advance the tape. Also in playback press this button to do a rapid forward visual search.

⑯ **Slow Motion Buttons**
Press the Slow button in playback for slow motion on tapes recorded in SLP. The Up/Down buttons let you adjust the slow motion speed from about 1/5 to about 1/30 of normal speed.

⑰ **Video Button**
Used to display the Video Adjust Menu.

⑱ **Frame Advance Button**
Press to advance the picture frame-by-frame in still mode for tapes recorded in SLP. Press this button to scan several seconds you want to skip in a playback.

⑲ **Timer Button**
To set the Combination VCR for unattended recordings, or Standby OTR.

⑳ **Volume Buttons (Up/Down)**
Press either Volume Up or Down button to change the sound level.

㉑ **Mute Button**
To turn the sound off. Press again and the sound will return.

㉒ **Numeric Keys (0, 1, 2, 3, 4, 5, 6, 7, 8 and 9)**
Used to select tuner channels and functions selected with OSD (On Screen Display).

㉓ **Channel Up/Down Keys**
Used to select the desired Combination VCR tuner channel. Can also be used to clear or reset items in a displayed program.

㉔ **Time Search Button**
This button can make search easier by allowing you to skip back or ahead on a tape.

㉕ **Book Mark Search Button**
To locate the beginning of a blank portion of tape for continuous recording.

㉖ **Channel Search Button**
Press this button to start a scan of the channels assigned to the Channel Up/Down keys. When the desired channel appears, press this button again to select it.

㉗ **Tape Speed Selector (SP/LP/SLP)**
Set this selector to the desired recording speed.

㉘ **Rec Button**
To record.

㉙ **Play Button**
To play back a tape.

㉚ **Pause/Still Button**
To temporarily stop the tape during recording or to view a still picture during playback.

㉛ **Double Speed (X2) Playback Button**
Press this button during playback with tapes recorded in SLP mode to search forward at twice the normal speed.

㉜ **Tracking Control**
Use this control during playback or double speed playback if the image is partially obscured by bands of noise.

㉝ **Add/Delete Button**
Used to add or delete a selected channel.

㉞ **Normal Button**
Used to set all the Video Adjust controls at a factory set level.

㉟ **Video Level Buttons**
Used to adjust video controls.

B. SERVICE NOTES AND CAUTIONS

When servicing, take notice of following items.

A. Cylinder Rotation in Quick Play Feature

With this model, Quick Play Feature has been introduced. Thus the cylinder will continue to run for approximately 10 minutes after the tape is initially inserted or after the STOP button is pressed. After approximately 10 minutes the cylinder will stop and after 30 minutes the mechanism goes to the STBY STOP.

B. Servicing the TV Section

1. In the order described in the Disassembly of Cabinet Parts Section, remove Back Cover Unit and place TV set as it is for servicing C.B.A.s as shown in Fig. 1.
2. Pull TV Main C.B.A. out to the rear and carefully place it into the position as shown in Fig. 1.

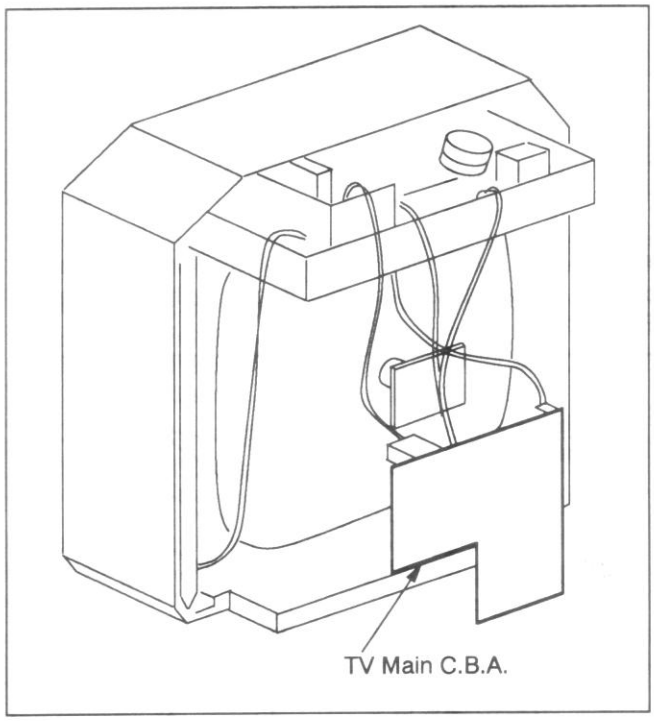


Fig. 1

C. Servicing the VCR Section

C-1. Service Position (1)

Service position (1) is used for the checking of Mechanism and Electronic Circuits.
In this position, check of movement and replacement of mechanical parts of the Mechanism Chassis are possible.
In this position, check of electronic circuit on the Main C.B.A. from the component side of the board is possible using the screening of the foil pattern.
To position the VCR Unit for servicing as shown in Fig. 2-1, use the following procedure.

1. In the order described in the Disassembly of Cabinet Parts Section, remove Back Cover Unit.
2. Remove 2 Screws (S-2) in Fig. D3, page 1-2-2.
3. Carefully pull out the VCR Unit from TV Cavity and place it as shown in Fig. 2-1.
4. Remove 2 Screws (S-3) and 2 Screws (S-4) in Fig. D5, page 1-2-2. Then remove Top Cover.
5. Remove 5 Screws (S-5) in Fig. D6, page 1-2-3. Then remove Bottom Cover.
6. Remove 2 Screws (S-9), 2 Screws (S-10), Screw (S-11), Screw (S-13), Screw (S-14) and Mechanism Support Plate in Fig. D10, page 1-2-4.
7. Remove 2 Screws (S-15) and Screw (S-16) in Fig. D11, page 1-2-4.
8. Raise the Mechanism Chassis and fix it using Mechanism Support Plate which was used to fix the Mechanism Chassis on the Frame.

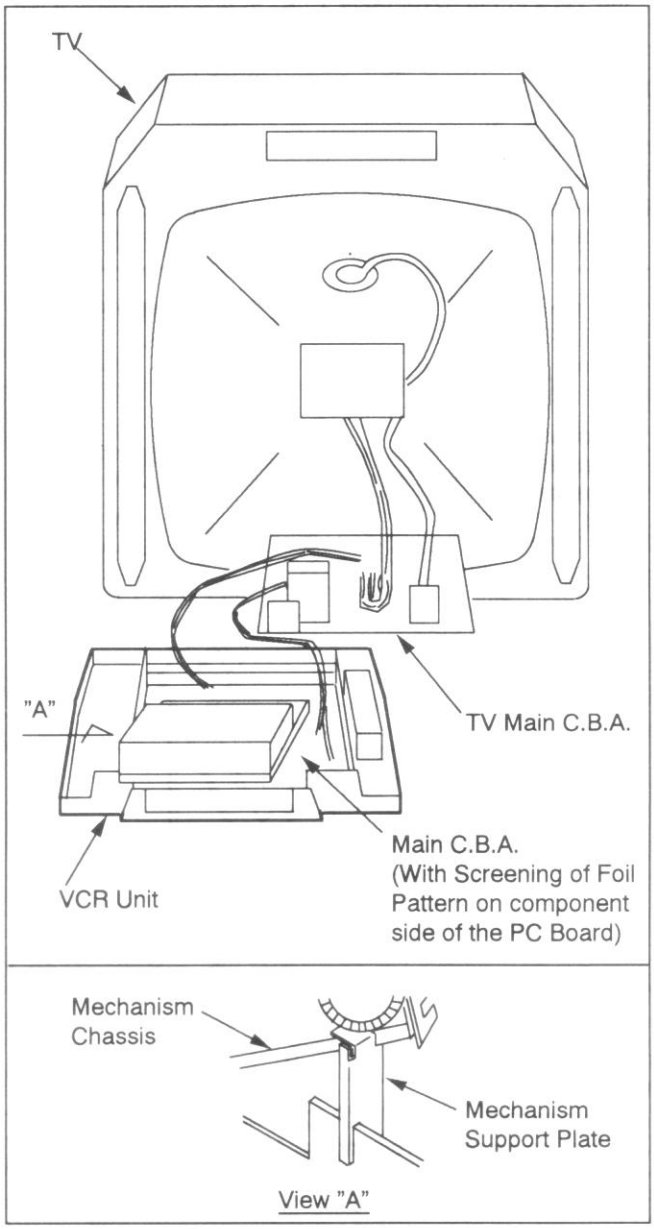


Fig. 2-1

C-2. Service Position (2)

Service Position (2) is used for the checking and replacement of Mechanical and Electrical parts.
To position the VCR Unit for servicing as shown in Fig. 2-2, use the following procedure.

1. Remove Back Cover Unit. Then carefully pull out the VCR Unit from TV Cavity and place it on table near TV Cabinet.
2. Remove Top Cover, Front Pnael Ass'y and Operation Ⅰ, Ⅱ C.B.A.s
3. Remove 2 Screws (S - 9), 2 Screws (S - 10), Screw (S-11), Screw (S-12), Screw (S-13), Screw (S-14) and Mecanism Support Plate in Fig. D10, page 1-2-4.
4. Disconnect connector P1201 in Fig. D8, page 1-2-2.
5. Lift up the VCR Chassis Unit by holding Top Plate of Cassette Up Unit as shown in Fig. 2-3, release 2 Locking Tabs in Fig. D10, page 1-2-4, and then place it left side down. When holding Top Plate of Cassette Up Unit, refer to under Note Item 2.
6. Remove 2 Screws (S-15) and Screw (S-16) in Fig.D11, page 1-2-4.
7. Open the Mechanism Chassis with Cassette Up Unit.
8. Remove the Power Supply Ass'y from VCR Cabity.
9. Then connect connector P1201 and Power Supply Ass'y to the Main C.B.A. with one screw and supporter.

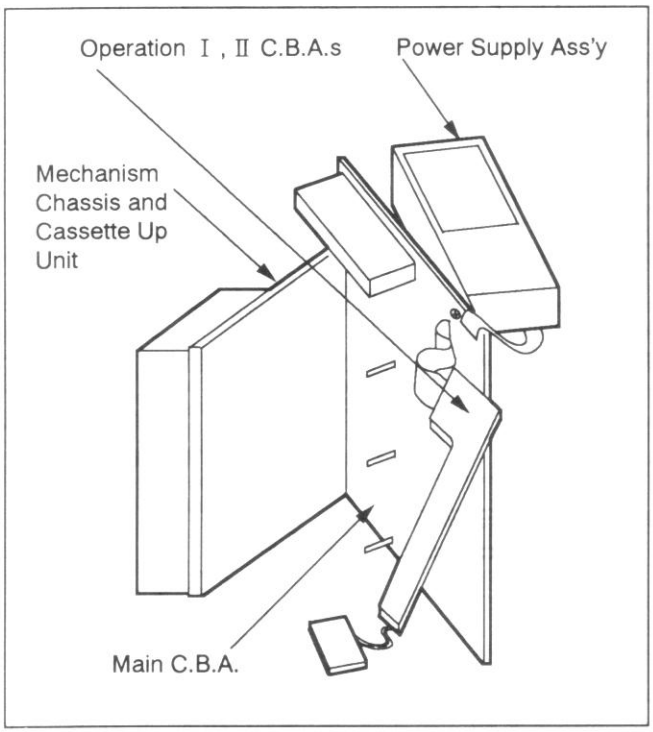


Fig. 2-2

Note:
1. When lifting up the VCR Chassis Unit, do not hold at the inside of the rectangular hole of Top Plate on the Cassette Up Unit. Refer to Fig.2-3

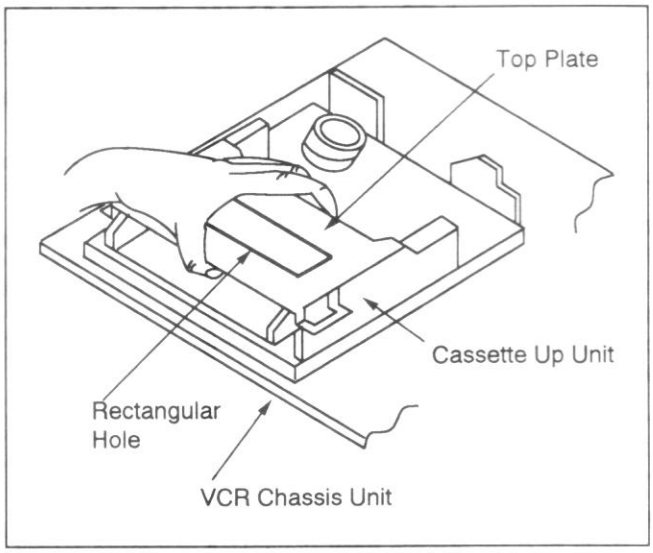


Fig. 2-3

2. When servicing in Service Position (2), do not use a T160 tape. It may cause the Tape to Jam.
3. If misloading of the cassette tape is encountered in this position, press the Cassette Tape firmly into the Cassette Up Unit with the left thumb.

C-3. Procedure for Closing Mechanism Unit on Main C.B.A.

Align Sensor LED with hole in Mechanism Chassis by pushing Sensor LED backward gently by hand. Refer to Fig. 2-4.

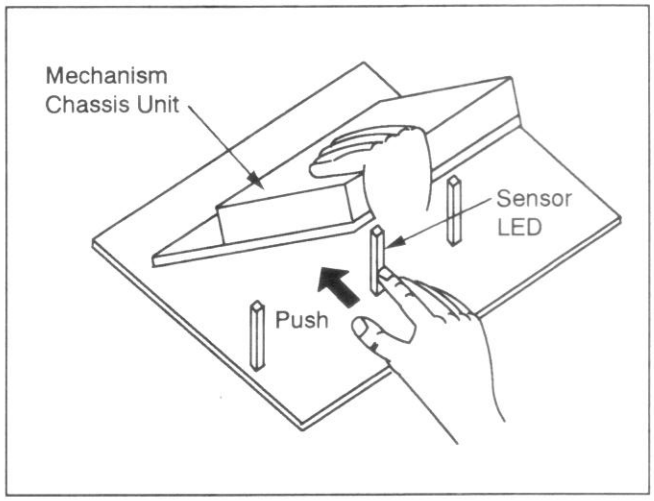


Fig. 2-4

D. Test Point Information

D-1. Actual Board on VCR

With this model, Test Pin or component leads are now used as Contact Points for adjustment and checking. In case of other Test Points with no Test Pin or component leads, use the foil solder pad for connection of the measuring equipment.
Some TPs are indicated on both the Component and Foil Side of the P.C.B. Some of these TPs are positioned differently between Component and Foil Side but they are on the same signal path.

D-2. Schematic and C.B.A. Diagrams in this Service Manual

- ● : Used for the indication of Test Point with Test Pin.
- □→ : Used for the indication of Test Point with Component Lead on Foil Side.
- □→ : Used for the indication of Test Point with Component Lead on Component Side.
- ▨ : Used for the indication of Test Point with No Test Pin.

D-3. Location of Test Points on page 1-2-36

- ● : Used for the indication of Test Point with Test Pin.
- ○ : Used for the indication of Test Point with No Test Pin(Foil Solder Pad).
- ◑ : Used for the indication of Test Point with Component Lead.

E. Service of Capstan Motor Drive C.B.A.

When servicing, avoid touching IC2502 on the Capstan Motor Drive C.B.A. because it is **HOT** during normal operation.

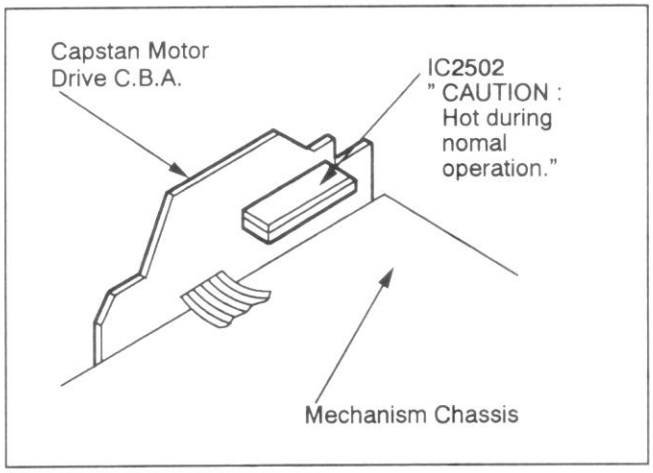


Fig. 3

F. Connection of the Flat Cable to Trap Connector

Plug No.	Location of Trap Connector	Type
P2503 – P1541	A/C Head Unit	A
P7501 – P7551	Operation I C.B.A.	A
P1001 – P1201	Main C.B.A.	B

For the identification of Pin 1 of Flat Cable, a different Color Identification Line is used.
For the Location of Pin 1 on the Trap Connector, use the pin 1 indication on the Typical C.B.A.

Note :
Triangle on top of connector does not indicate Pin 1.

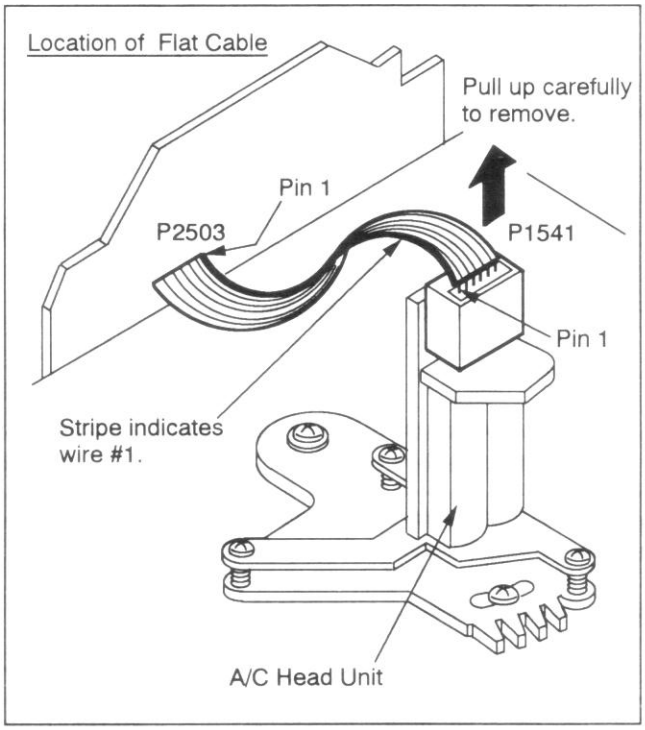


Fig. 4-1

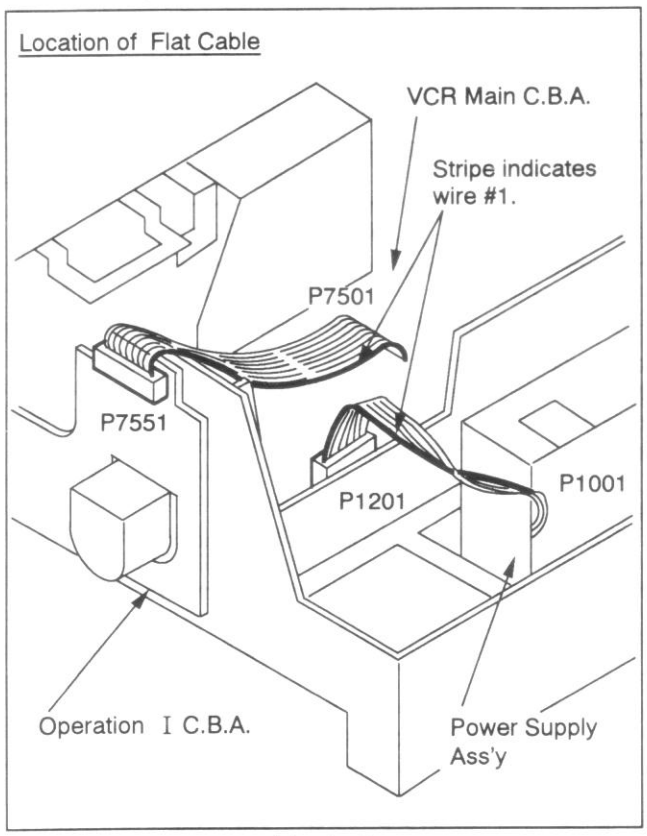


Fig. 4-2

(Removal or Installation of Flat Cable)

a. Removal

1. Type A used in the A/C Head Unit and Operation I C.B.A.

   1) Pull Flat Cable out minimizing stress by holding it securely to avoid damage of the individual wires as shown in Fig. 5-1.

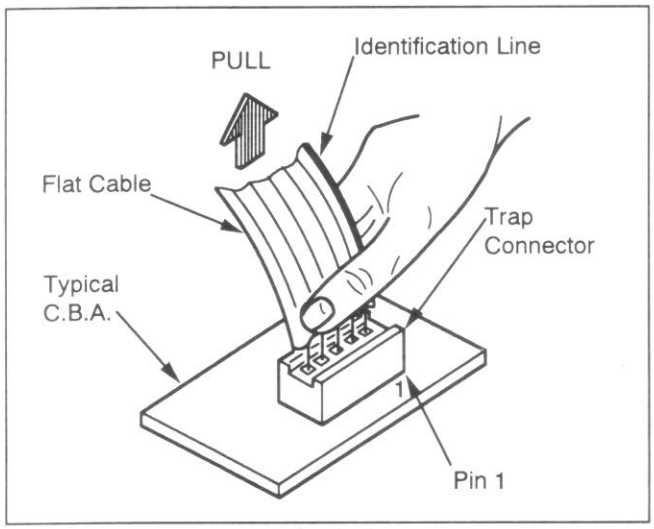


Fig. 5-1

2. Type B used in the Main C.B.A.

   1) Pull Flat Cable out while pusing againat the ⓐ portion of the Trap Connector in the direction indicated by arrow to unplug as shown in Fig 5-2.

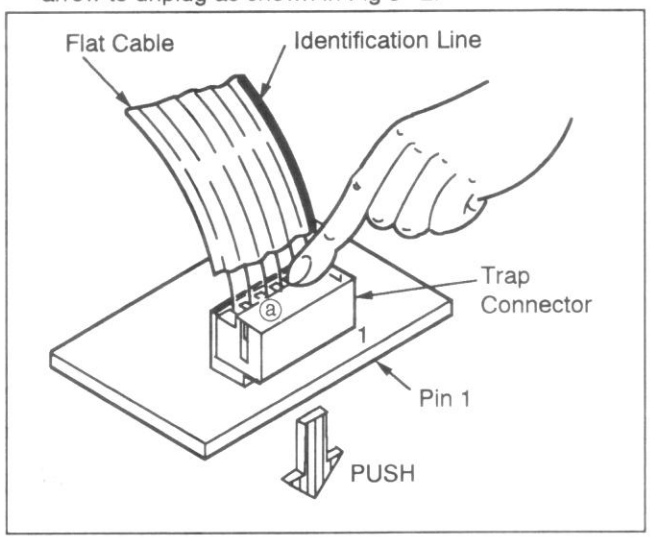


Fig. 5-2

Note :
After unplugging, make sure that the ⓐ portion of the Trap connector has returned to its original position.

b. Installation

1. Adjust the position of the Flat Cable so that the Identification Line on the Flat Cable aligns with Pin 1 of the Trap Connector in Fig. 5-1 and 5-2.
2. Align the individual wire with their individual Trap Connector Holes. Then insert the Flat Cable wires into the Trap Connector.

Note:
After installation inspect the Connection to ensure that the individual wires are not bent or touching another wire.

G. Removal / Installation of Mechanism Chassis to Main C.B.A.

a. Removal
When removing Mechanism Chassis from Main C.B.A., lift it up while holding down the rear side of Main C.B.A. as shown in Fig. 6-1.

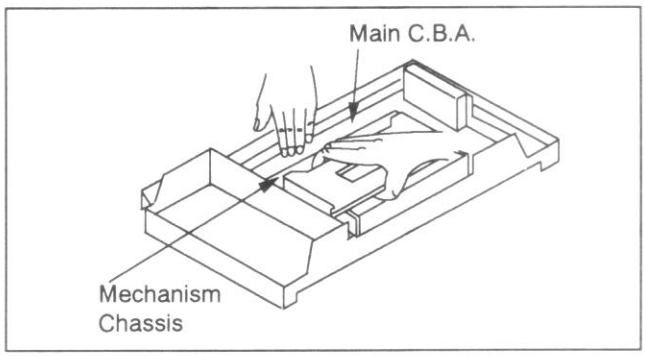


Fig. 6-1

b. Installation

Install the Mechanism Chassis to the Main C.B.A. at an angle.

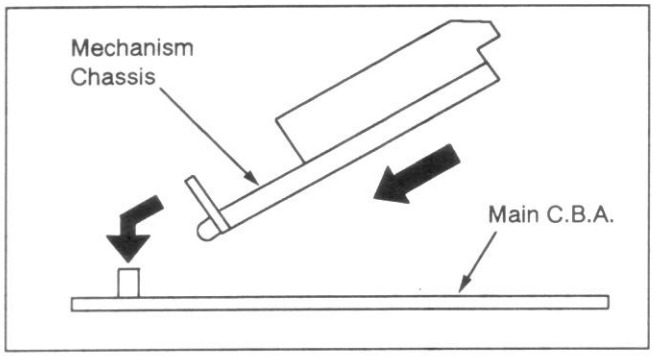


Fig. 6-2

H. Service Test Point (TP6001)

The detection of the Supply / Takeup Photo Transistors, Cassette Down, Reel Sensor and Cylinder Lock will be inhibited when TP6001 is grounded on the System Control Section of the Main C.B.A.

Note :

If a Cassette Up Unit is removed and TP6001 is grounded, confirmation of Mechanism movement without Tape is possible.

I. Variable Voltage Isolation Transformer

Because a Hot Chassis Ground is present in the Power Supply Circuit, an Isolation Transformer must be used. Also, in order to have the ability to increase the input voltage slowly, when troubleshooting this type Power Supply Circuit, a variable isolation transformer is required.

J. Simplified Fault Finding Point (TP6002)

This model has the Simplified Self - Diagnostic System to facilitate finding the cause when the Unit shuts off or stops automatically.

1. Preparation
   Connect the OSCILLOSCOPE probe to TP6002 on the System Control Section of the Main C.B.A.

2. Indication
   The Signal at TP6002 indicates the following causes.

Note:
In normal condition, DC +5V Signal at TP6002 is displayed.

No.	Information	Indication	Cause and characteristic
1.	Takeup Reel Lock	Low Voltage 0V	There is no TAKEUP REEL Sensor Pulse for 5 seconds or 1 second (only SEARCH MODE). (Takeup Reel Sensor Pulse at pin 68 of IC6001)
2.	Cylinder Lock	0.3Hz Pulse (Duty 50%) 3.0Sec 5V 0V	Cylinder Motor stops in the REC, PB, CUE, REVIEW, SLOW or STILL mode for 1 second. (Cylinder Lock (L) signal is detected inside IC6001)
3.	Exceeds Loading/Unloading Time	0.75Hz Pulse (Duty 50%) 1.5Sec 5V 0V	Loading/unloading time exceeds the normal loading/unloading time, with no shift to the next mode. (Position signals supplied from Mode Select Switch to pins 78 - 81 of IC6001)
4.	Exceeds Cassette Loading/Unloading Time	Intermittent Pulse 350mSec 2Sec 5V 0V 1.0Sec	Cassette loading/unloading time exceeds the normal cassette loading /unloading time, with no shift to the next mode. (Cassette Off (H) / Up (M) / Down (L) signal at pin 77 of IC6001)

K. Method for Manual Loading / Unloading of VCR

Turn the Worm Unit of Motor Block Ass'y in Fig. 7 counter-clockwise (for loading) or clockwise (for unloading) from the Front Side.

Note :

Do not apply +12V to the Terminals of Loading Motor on the Motor Block Ass'y.

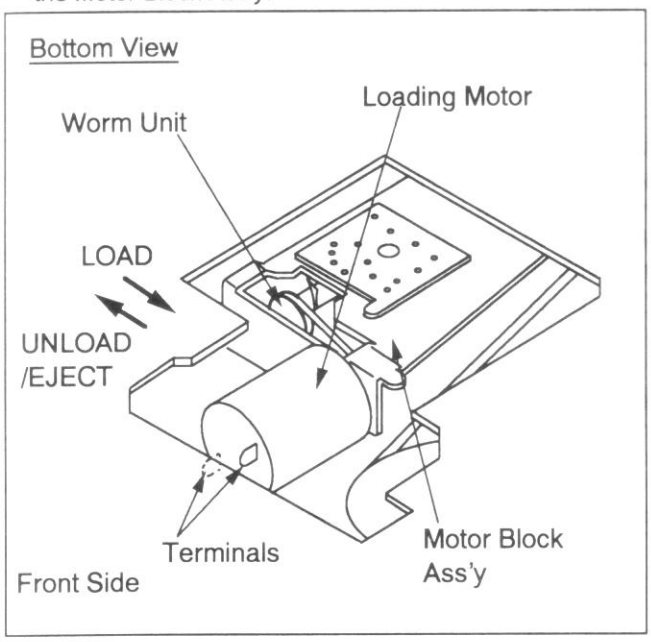


Fig. 7

L. How to place the Cassette Holder in the Down Condition without a Cassette Tape

To place the Cassette Holder in the down position without a cassette tape, use the following procedure.

Method 1 – Refer to Fig. 8.

1. Disconnect AC Plug.
2. In the order described in the Disassembly of Cabinet Parts Section, remove the VCR Chassis Unit.
3. Place the Unit left side down.
4. Turn the Worm Unit counterclockwise (Front View) until the Top of Set Lever L and R is locked by the First Locking Tab-Left and Right.
5. Clear the First Locking Tab-Left and Right by pressing the top of the Set Lever L and R down.
6. Turn the Worm Unit counterclockwise (Front View) until the top of Set Lever L and R is locked by the Second Locking Tab-Right and Left.
7. Clear the Second Locking Tab-Right and Left by pressing the Top of the Set Lever L and R down.
8. Continue to turn the Worm Unit to the Cassette Down Position is obtained.

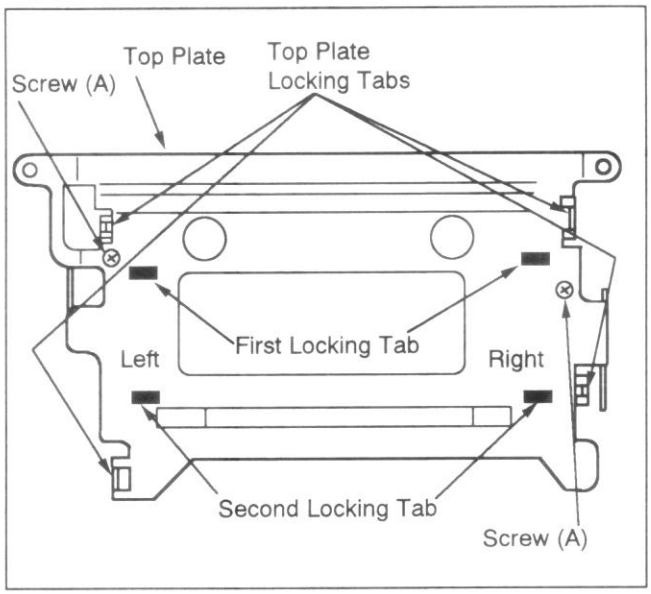


Fig. 8

Method 2 is an alternate method for loading with no tape.

Method 2 – Refer to Fig. 8.

1. Place the Unit in the Service Position (1).
2. Connect TP6001 and GND on the System Control Section of the Main C.B.A. through a jumper wire.
3. Connect AC Plug.
4. VCR turns ON automatically and Cassette Holder is loaded and then the the top of Set Lever L and R is locked by the First Locking Tab-Left and Right. Then VCR turns OFF.
5. Clear the First Locking Tab by pressing the top of the Set Lever L and R down.
6. Turn the Power Switch ON.
7. The top of Set Lever L and R is locked by the Second Locking Tab (Same as Step 4)
8. Clear the Second Locking Tab by pressing the top of the Set Lever L and R down.
9. Turn the Power Switch ON .
10. The Unit is placed in the cassette down condition and then loading operation is completed.

Method 3 is an alternate method for loading with no tape.

Method 3

1. Place the Unit in the Service Position (1) and remove 2 Screws (A) in Fig. 8. Then remove the Top Plate of Cassette Up Unit by releasing the 4 Top Plate locking tabs shown in Fig. 8.

   Note :
   When removing the Top Plate of Cassette Up Unit, work with care so as not to break the locking tabs in Fig. 8.

2. Connect TP6001 and GND on the System Control Section of the Main C.B.A. through a jumper wire.
3. Plug in AC cord and place the unit in the down condition. Then place it in the loading operation sequence.

   Note :
   To place the Unit in the cassette up condition, Power Switch ON and push the STOP/EJECT Button to eject.

M. Black Screws on the Chassis

Black Screws are used on the Mechanism Chassis to identify screws that require adjustment.

N. How to defeat the Auto Tracking Function

To defeat Auto Tracking Function place a jumper between TP6003 and +5V(TP6009) on the System Control Section of the Main C.B.A. in STOP Mode to maintain the Neutral Position.

O. Set Tracking to the Neutral Position

Eject and reinsertion of Tape will access the Neutral Tracking position.

P. How to remove a Jammed Tape

1. In the order described in the Disassembly of Cabinet Parts Section, pull out VCR Unit and remove Top Cover, Bottom Cover, Front Panel Ass'y and Operation Ⅰ, Ⅱ C.B.A.s.
2. Remove 2 Screws (S - 9), 2 Screws (S - 15) and Screw (S - 16) in Fig. D10 and Fig. D11, page 1 - 2 - 4.
3. Remove 2 Screws (S - 17) and 2 Screws (S - 18) in Fig. D12, page 1 - 2 - 4.
4. Lift Up the Cassette Up Unit carefully. Remove 2 Screws (S - 10), Screw (S - 11), Screw (S - 13), Screw (S - 14) and Mechanism Support Plate in Fig. D10, page 1 - 2 - 4.
5. Reinstall the Cassette Up Unit to the Mechanism Chassis tightening 2 Screws (S - 17) and 2 Screws (S - 18) in Fig. D11, page 1 - 2 - 4.
6. Then remove Mechanism Chassis from Main C.B.A.
7. Then remove a Jammed Tape turning the Worm Unit of Motor Block Ass'y clockwise (for unloading).

Q. " ○ " Marks on C.B.A. Layout Indicate

" ○ " indicates the connection point between the Foil Side and the Component Side on the C.B.A.

R. High Voltage Component

Avoid touching the following High Voltage Components : CRT C.B.A., terminals on Deflection Yoke, Anode Cap, Q551 and terminals of Flyback Transformer on TV Main C.B.A.

S. Installation of Degaussing Coil

1. Remove 4 Screws (S - 19) and CRT as shown in Fig. D4 , page 1 - 2 - 2.
2. Install Binding Rope A and 2 Clampers (B).
3. Install the Degaussing Coil on the CRT.
4. Fix the lower of the Degaussing Coil to Binding Rope A using 2 clampers (A).
5. Then fix the both upper corners of the Degaussing Coil using 2 clampers (B).

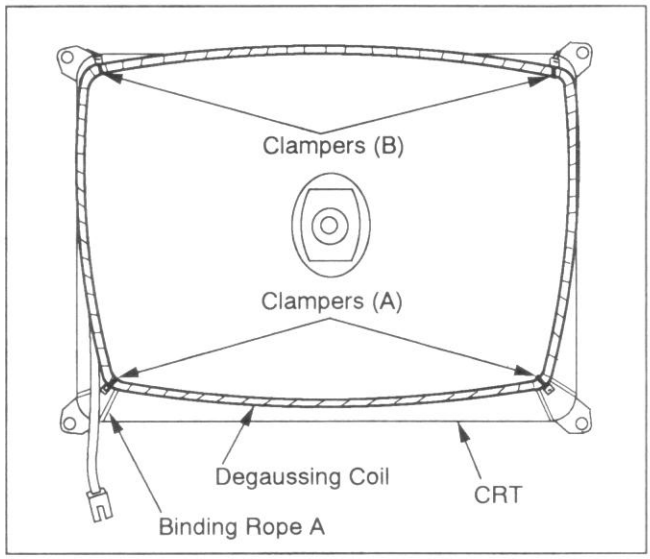


Fig. 9

T. How to read the Disassembly / Assembly Procedures

(For Cabinet Part)

STEP /LOC. No.	PART	REMOVAL		
		Fig. No.	REMOVE *UNLOCK/RELEASE /UNPLUG /UNCLAMP /UNSOLDER	Note
①	Back Cover Unit	D2	9(S-1)	···
②	VCR Unit	D3	2(S-2), *Connectors (K1, K2, K4, P4151)	1

① ③ ⑤ ⑥

(For Mechanical Part)

STEP /LOC. No.	START -ING No.	PART		REMOVAL		INSTALLATION
				Fig. No.	REMOVE *UNHOOK/UNLOCK/RELEASE/ UNPLUG/UNSOLDER	ADJUSTMENT #CONDITION
①	1	PINCH CAM CAP	T	DM1 DM3	*(L-1)	----------
②	1	PRESSURE ROLLER ARM UNIT	T	DM1 DM3	----------	(+) <Note 1>
③	1	P5 SECTOR GEAR	T	DM1 DM4	(C-1), <Note 2>	(+) See, Alignment Procedure for Mechanism Item 10-1.
④	3	PINCH CAM	T	DM1 DM3	----------	(+) See, Alignment Procedure for Mechanism Item 10-1.
⑤	4	P5 ARM UNIT	T	DM1 DM4	(N-1), (W-1), *(P-1)	(+) See, Height Adjustment of P5 Arm Unit.
⑥	6	A/C HEAD UNIT	T	DM1 DM5	(S-1), (S-2), 3(W-2), (W-3), *P1541	(+) See, Horizontal Position Adjustment of A/C Head.

① ② ③ ④ ⑤ ⑥ ⑦

① : Order of steps in Procedure
When reassembling, perform the step(s) in the reverse order.
These numbers are also used as the identification (location) No. of parts in Figures.

② : Starting No. followed by corresponding part which can be removed at this stage.
See example below.

Example :
Pinch Cam Cap can be removed without removing any other parts because the STEP/LOC. No. and the STARTING No. are the same.
But Pressure Roller Arm Unit can be removed only after removing Pinch Cam Cap (No. ①)

③ : Part to be removed or installed.

④ : Location of part.
T=Top; B=Bottom

⑤ : Fig. No. showing Procedure or Part Location.

⑥ : Identification of part to be removed, unhooked, unlocked, released, unplugged, unclamped or unsoldered.
P=Spring; W=Washer;
C=Cut Washer; N=Nut;
S=Screw
* =Unhook, unlock, release, unplug or unsolder
2(P-2)=2 Springs(P-2)

⑦ : Adjustment information for installation.
= Condition for adjustment
(+) : Refer to Exploded Views for Lubrication information.

U. Replacement procedure for Leadless (Chip) Component

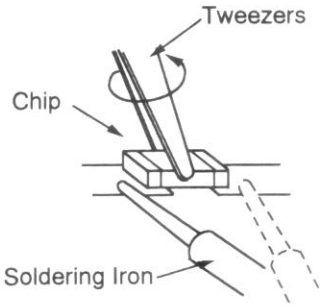
The following procedures are recommended for the replacement of the leadless components used in this Unit.

1. Preparation for replacement
   a. Soldering Iron
      Use a pencil-type soldering iron that uses less than 30 watts.
   b. Solder
      Eutectic Solder (Tin 63%, Lead 37%) is recommended.
   c. Soldering time
      Do not apply heat for more than 4 seconds.
   d. Preheating
      Leadless capacitor must be preheated before installation.
      (130℃ ~150℃, for about two minutes.)

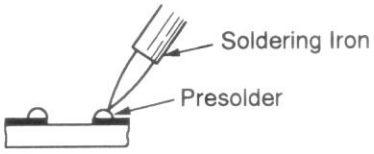
   Note:
   a. Leadless component must not be reused after removal.
   b. Excessive mechanical stress and rubbing of the component electrode must be avoided.

2. Removing the leadless component
   Grasp the leadless component body with tweezers and alternately apply heat to both electrodes. When the solder on both electrodes is melted, remove leadless component with a twisting motion.

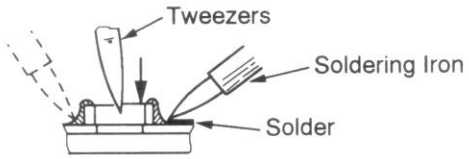
   Note:
   a. Do not attempt to lift the component off the board until the component is completely disconnected from the board by a twisting action.
   b. Take care not to break the copper foil on the printed board.



3. Installing the leadless component
   a. Presolder the contact points of the circuit board.



   b. Press the part downward with tweezers and solder both electrodes as shown below.



   Note:
   Do not glue the replacement leadless component to the circuit board.

V. Special Note

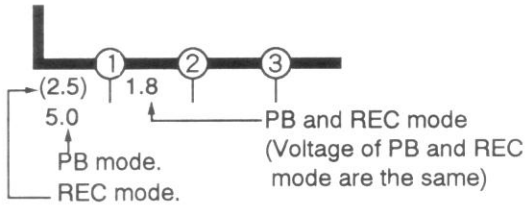
All integrated circuits and many other semiconductor devices are electrostatically sensitive and therefore require the special handlings techniques described under the "ELECTROSTATICALLY SENSITIVE (ES) DEVICES" section of this service manual.

W. Voltage Measurement

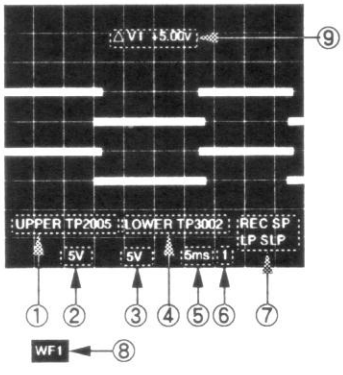
1. Voltage Chart
   a. Color bar signal in SP mode.
   b. - - - - : Unmeasurable or unnecessary to measure.

2. Schematic Diagram
   a. Audio Section
      monoscope signal in SP REC and PB mode.
   b. Other Sections
      color bar signal in SP REC and PB mode.

   Note:
   Voltage Indications for REC and PB mode on Schematic are as shown below.



X. How to Read Waveform



① Connecting Point
② Volts/Div
③ Volts/Div
④ Connecting Point
⑤ Time/Div
⑥ Trigger Channel of the scope
(1: UPPER, 2: LOWER)
⑦ Operation Mode of VCR
⑧ Waveform Point on Schematic
⑨ △V1: Peak to Peak.

Y. Indication for Zener Voltage of Zener Diodes

The Zener Voltage of Zener Diodes are indicated as such on schematic Diagrams.

Example:
(6.2V)...Zener Voltage

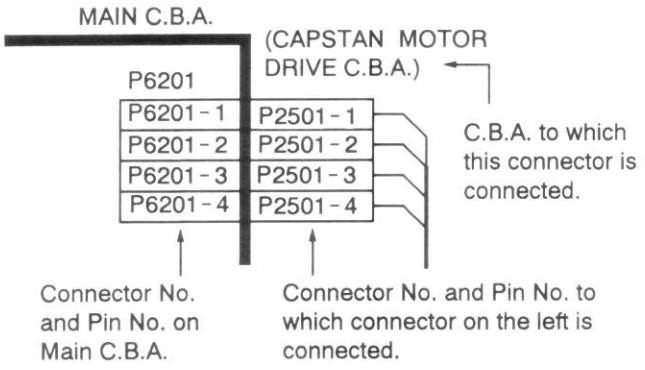
Z. How to Identify Connectors on Schematic Diagrams

Each connector is labeled with a connector No. and Pin No. indicating what it is connected to, in other words, its counter part.

Connections between large P.C.B.'s and small circuit Boards are illustrated on the large P.C.B. schematics.

Use the interconnection schematic diagram to find the connections between associated connectors.

Example:
The connections between C.B.A.'s are as shown below.

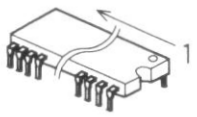


Use this cross reference chart to determine the equivalent model used in the Adjustment Procedures, Schematic Diagrams, Exploded Views and Parts List.

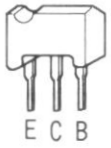
MODEL	MARK
PV-M2021	A
VV1220	B
VV1220W	C

C. ICs/TRs Information

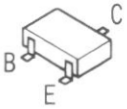
GENERAL C.B.A. / ASS'Y PARTS



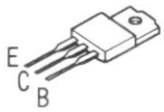
AN3826NK,
AN5176K,
UPD6326C



2SB641,
2SD636,
2SD1458

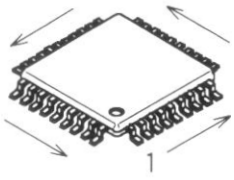


2SB709,
2SB710,
2SD601



2SC4130,
2SC3852

MAIN C.B.A.



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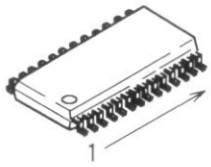
MN187204VXU



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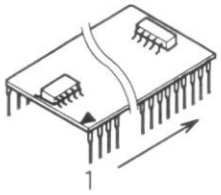
MB90073-103



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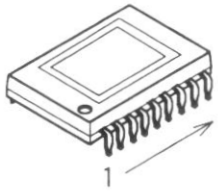

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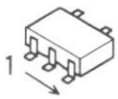

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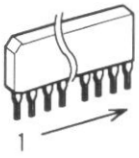

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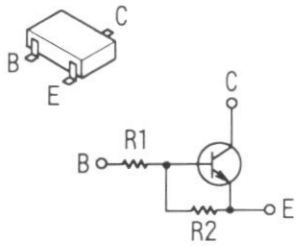
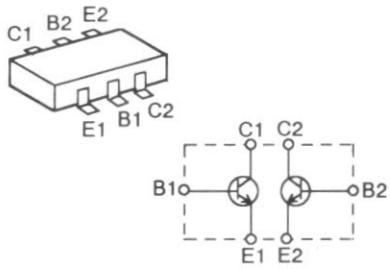
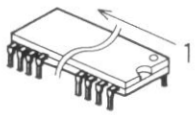


UN2212(R1=22K, R2=22K),
DTC124EK(R1=22K, R2=22K),
DTC314TK(R1=10K, R2=OPEN)



IMX1

TV MAIN C.B.A.



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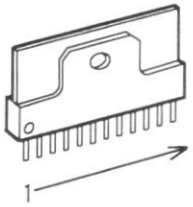
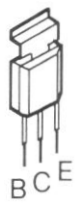


LA7835

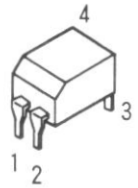
STR30130



2SC2653H

2SD1441

POWER SUPPLY ASS'Y



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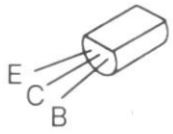
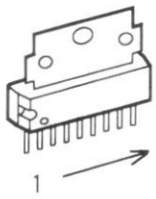
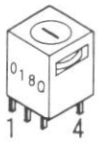


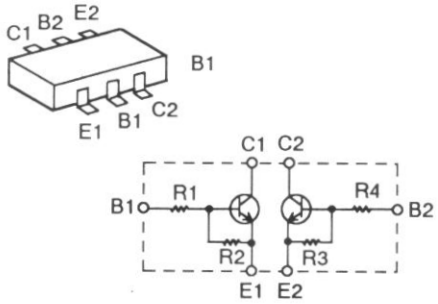
2SC1648, 2SA564



AN5265

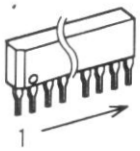


T4101
E1Q70F018Q



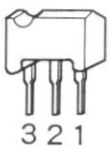
RN4601 (R1=4.7K, R2=4.7K, R3=4.7K, R4=4.7K)

CAPSTAN MOTOR DRIVE C.B.A.



PUA3228

TIMER/OPERATION I C.B.A.



MN1280L

HOW TO READ THE IDENTIFICATION MARK OF CHIP TRANSISTORS IN THIS UNIT.

MARKING	PART NO.	MARKING	PART NO.
A	2SB709	Y	2SD601
C	2SB710	X1	IMX1
H04	DTC314TK	8B	UN2212
VA	RN4601	25	DTC124EK

A. MECHANICAL ADJUSTMENT PROCEDURES

1. DISASSEMBLY OF CABINET PARTS

1. DISASSEMBLY FLOW CHART

This flow chart indicates the disassembly steps of the cabinet parts and the P.C. Boards in order to gain access to item(s) to be serviced. When reassembling, perform the step(s) in the reverse order.

Note :

When removing the Front Panel Ass'y, work with care so as not to break the locking tabs on the panel.

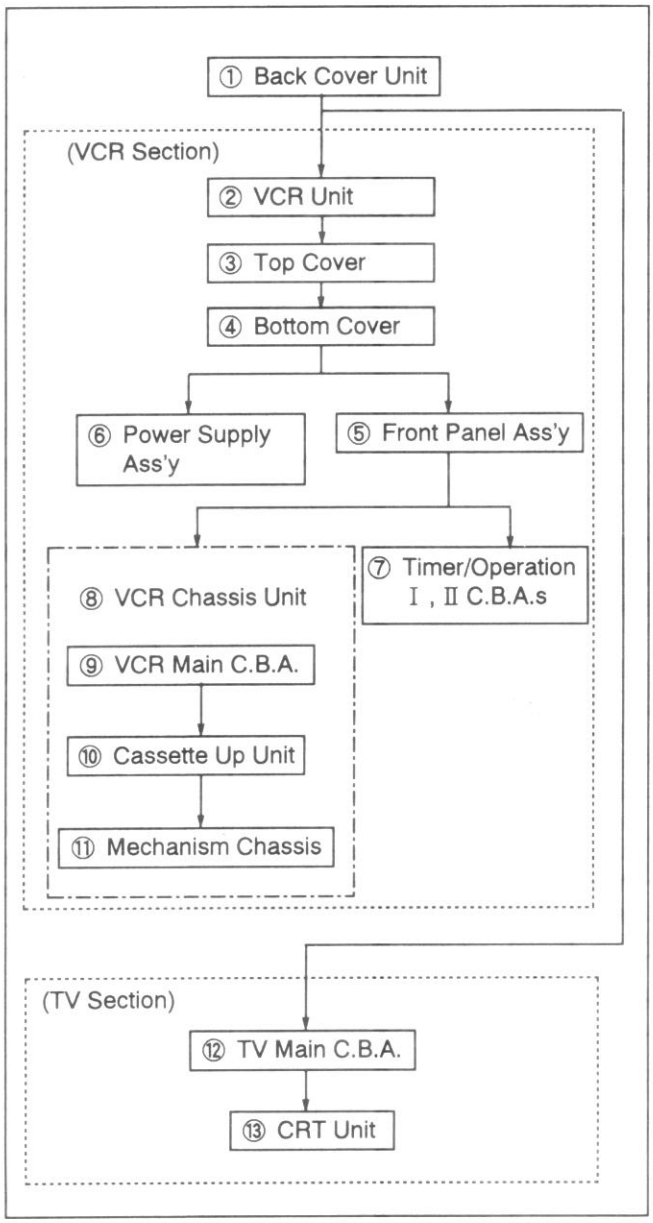


Fig. D1

2. DISASSEMBLY METHOD

STEP /LOC. No.	PART	REMOVAL		
		Fig. No.	REMOVE *UNLOCK/RELEASE/ UNPLUG/UNCLAMP/ UNSOLDER	Note
①	Back Cover Unit	D2	9(S-1)	.....
②	VCR Unit	D3	2(S-2), *Connectors(K1, K2, K4, P4151)	1
③	Top Cover	D5	2(S-3), 2(S-4)	.....
④	Bottom Cover	D6	5(S-5)	.....
⑤	Front Panel Ass'y	D7	2(S-6), *2(L-1), *2(L-2)	2
⑥	Power Supply Ass'y	D8	*P1210, (S-7), (S-8)	.....
			*3(L-3)	3
⑦	Operation I and Operation II C.B.A.s	D9	*P7551, *9(L-4)	.....
⑧	VCR Chassis Unit	D10	2(S-9), 2(S-10), (S-11), (S-12), (S-13), (S-14), Mechanism Support Plate, *2(L-5)	4
⑨	VCR Main C.B.A.	D11	2(S-15), (S-16), *P3501, *P2501, *P4002	.....
⑩	Cassette Up Unit	D12	2(S-17), 2(S-18)	5
⑪	Mechanism Chassis	D12	.....	6
⑫	TV Main C.B.A.	D3	*Connectors	.....
⑬	CRT Unit	D4	4(S-19)	.....

List of Abbreviations :

2(S-1)=2 Screws (S-1)

2(L-1)=2 Locking Tabs (L-1)

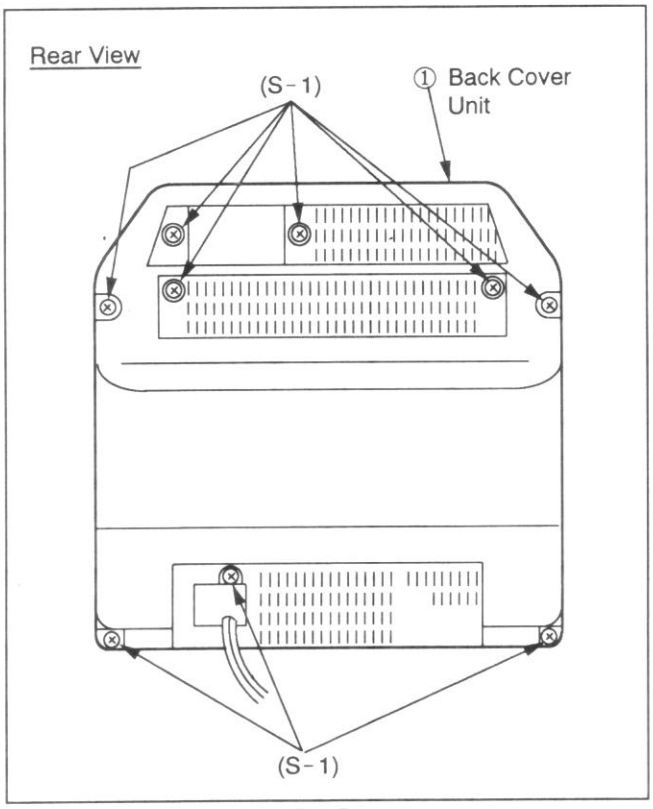


Fig. D2

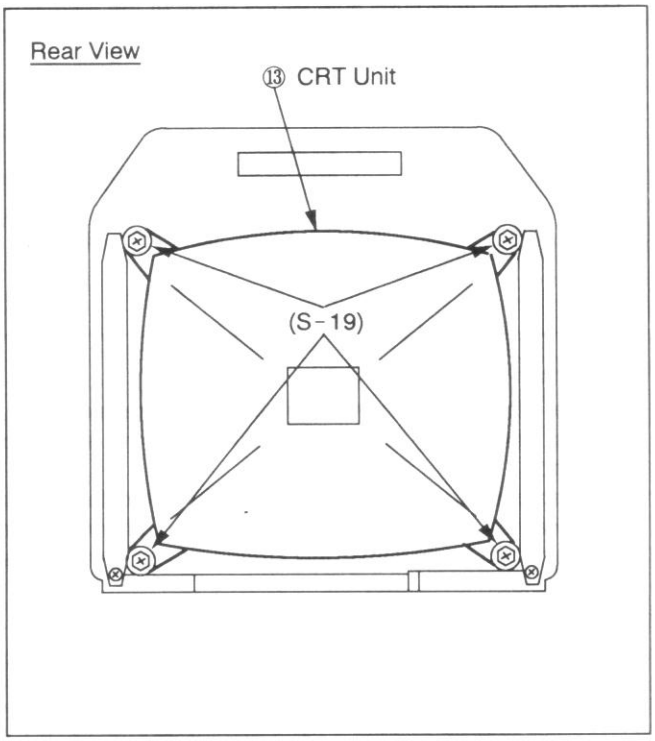


Fig. D4

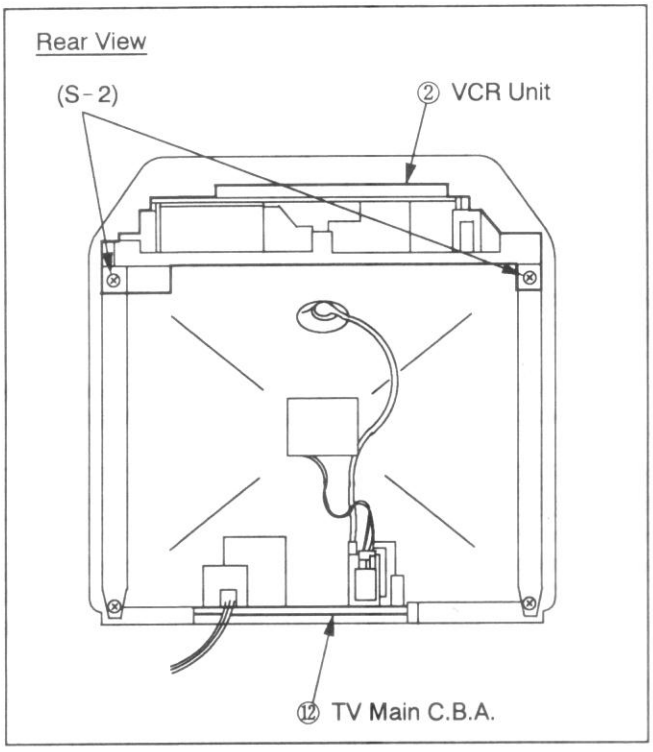


Fig. D3

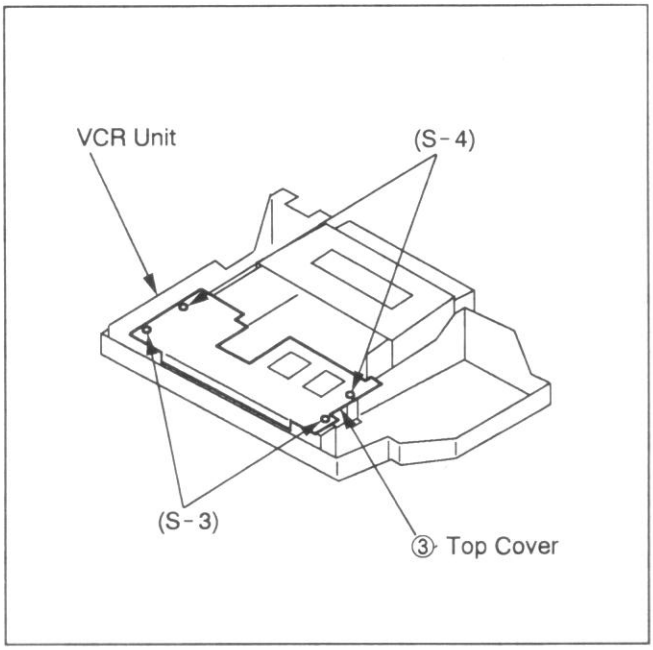


Fig. D5

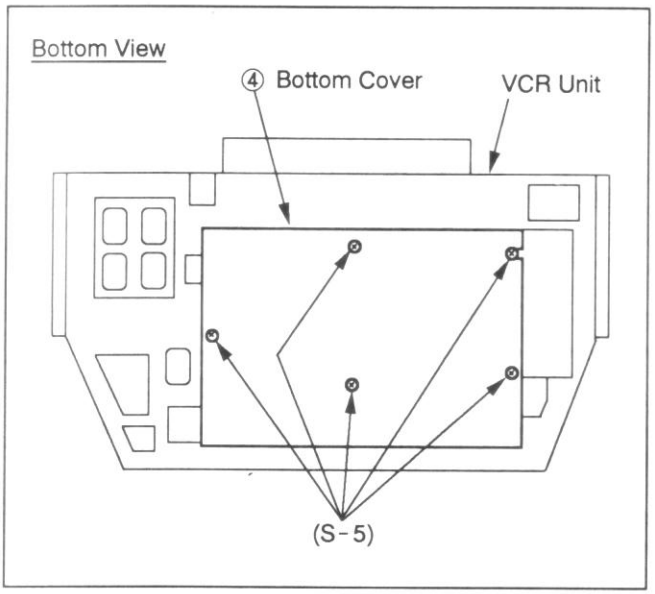


Fig. D6

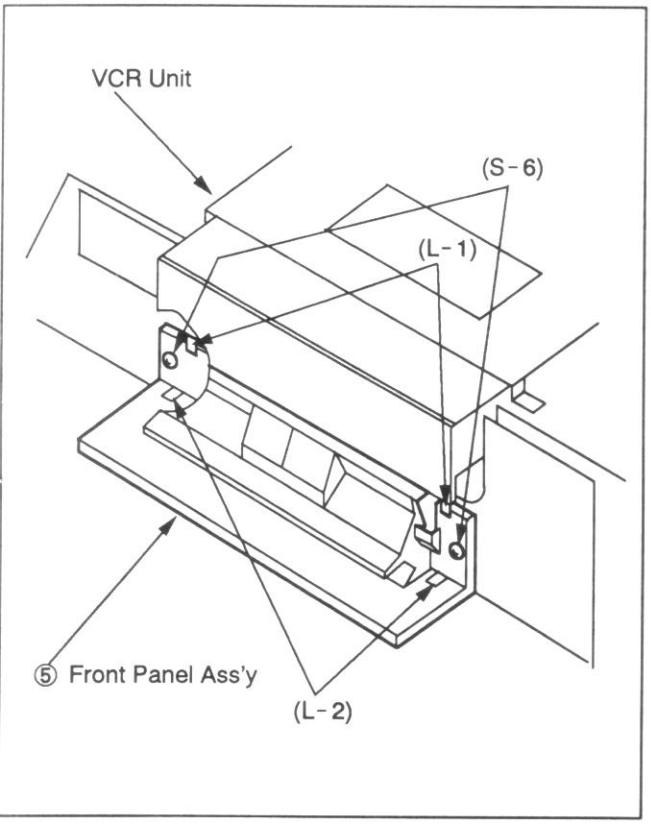


Fig. D7

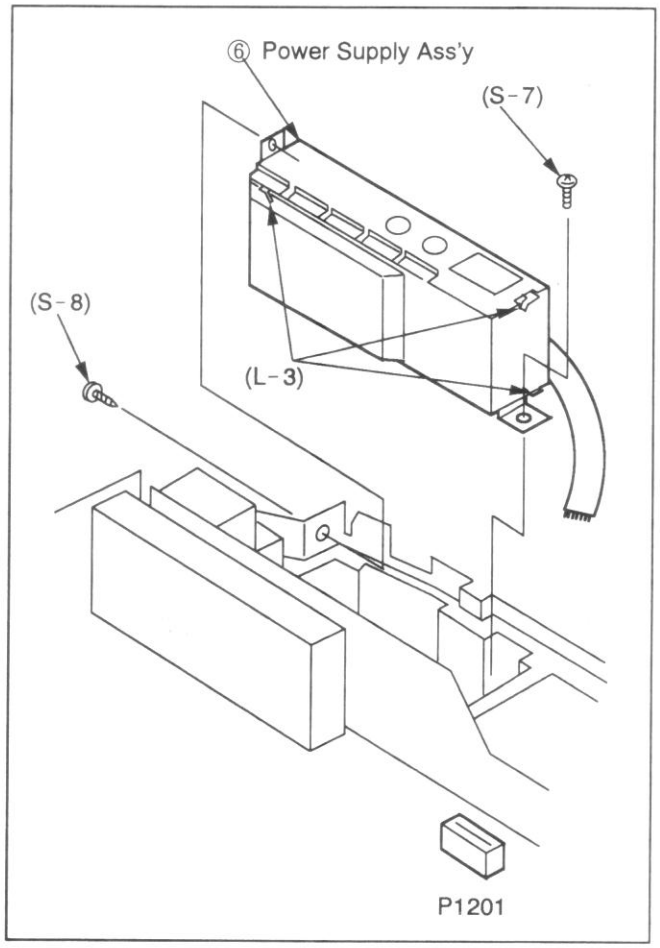


Fig. D8

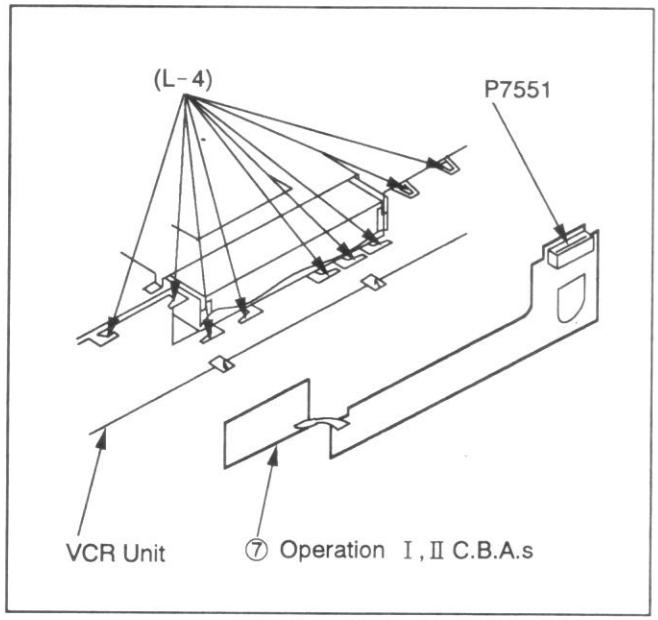


Fig. D9

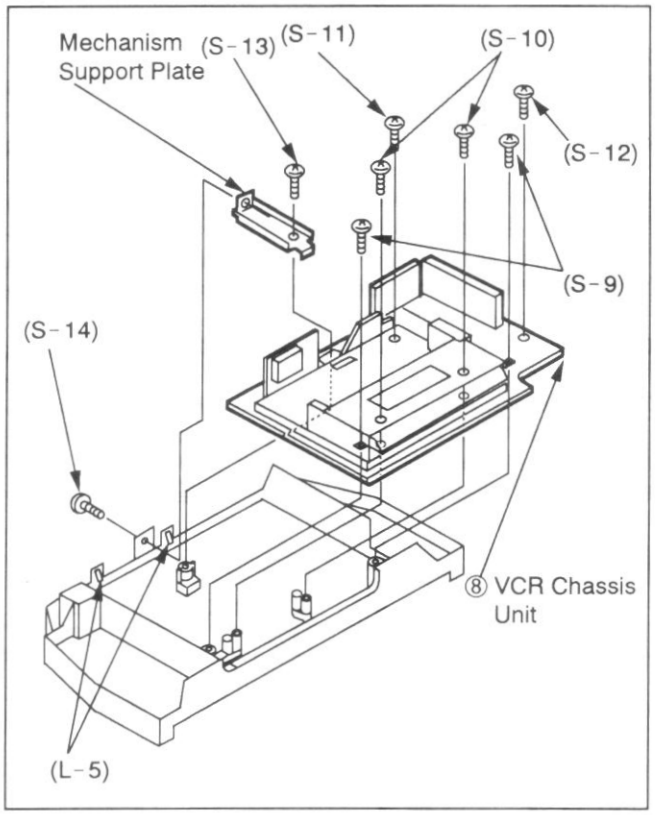


Fig. D10

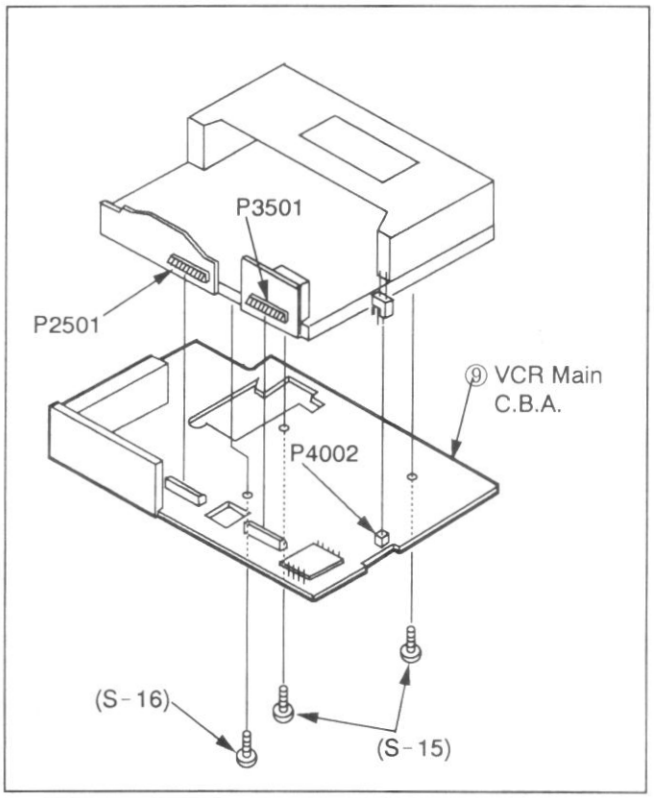


Fig. D11

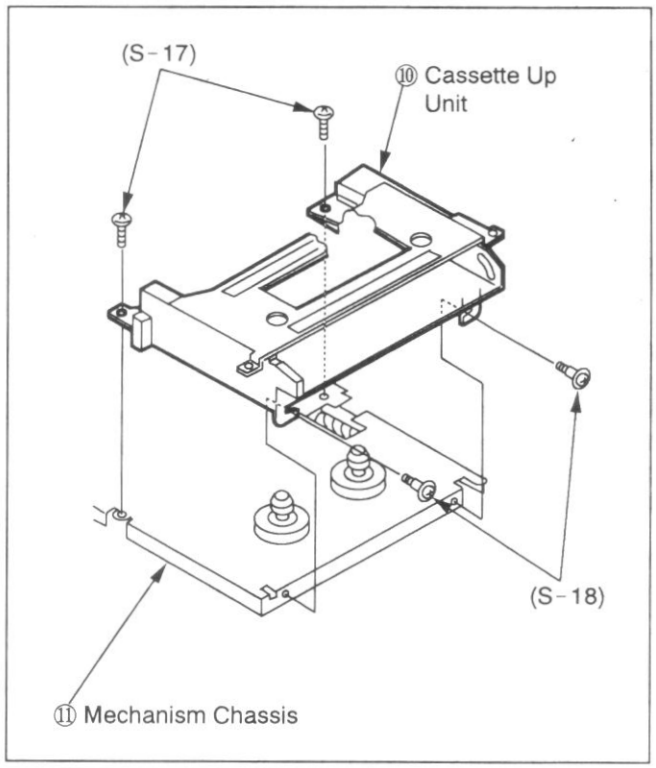


Fig. D12

Reference<Notes>in Table 2:

1. To remove the VCR Unit from TV Cavity, first remove the connectors on the TV Main C.B.A. coming from the VCR Unit. Next remove 2 Screws (S-2). Then carefully pull out the VCR Unit from TV Cavity.
2. First remove 2 Screws (S-6). Second release 2 Locking Tabs (L-1). Then remove the Front Panel Ass'y releasing 2 Locking Tabs (L-2).
3. When removing the Shield Case of Power Supply Ass'y, twist and straighten 3 Locking Tabs (L-3) on the Power Supply Ass'y in Fig. D8. Then remove the Shield Case by pulling it away from Power Supply Ass'y.
4. When removing the VCR Chassis Unit, refer to SERVICE NOTES AND CAUTIONS Item C – 2.
5. When reinstalling the Cassette Up Unit, mechanical adjustment (alignment) should be performed for proper operation. Please refer to Adjustment of Cassette Up Unit and Chassis.
6. When reinstalling the Mechanism Chassis to Main C.B.A., refer to SERVICE NOTES AND CAUTIONS Item G.

2. ADJUSTMENT PROCEDURES

1. CONFIRMATION OF GROUNDING PLATE INSTALLATION POSITION

Purpose :
To optimize the position of Grounding Plate.

Symptom of Misadjustment :
May cause Cylinder rotating buzz.

Remove the Mechanism Unit. Place it upside down. Check to see if the Grounding Plate is properly set in a position just less than 1mm (but not more than 1mm) as measured from the center of the plate to the center of the Cylinder Shaft as shown in Fig. M1. If required, adjust the Grounding Plate position by loosening Black Screw (A).

Note :
Never install the Grounding Plate in the opposite position (on the left side of the center of the Cylinder Shaft), but always within a maximum of 1mm to the right side of the center of this shaft.

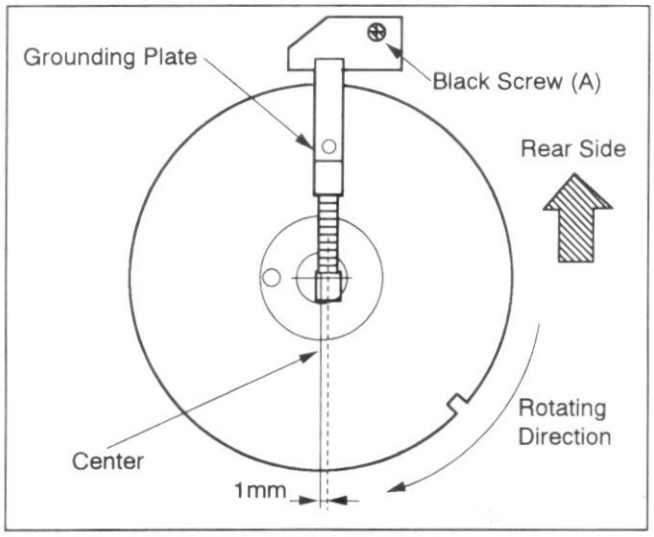


Fig. M1

2. POSITION ADJUSTMENT OF TENSION POST (PRELIMINARY)

Purpose :
To feed a constant tension to the tape so that tape runs with stability, by performing a preliminary adjustment.

Symptom of Misadjustment :
1) If the adjusted value is below the specification, the tape tension is not sufficient, thus causing a tape slack to occur.
2) If the adjusted value is above the specification, the tape tension is too high, thus causing tape damage to occur.

* Equipment Required :
2mm Hex. Wrench ·····(Purchase Locally)

1. Place the unit in the cassette down condition using Method 3 of SERVICE NOTES AND CAUTIONS Item L.
2. Remove the Cassette Up Unit.
3. Turn the Power Switch ON and push the Play Button to complete loading operation sequence.
4. As soon as loading is completed, disconnect the AC plug.
5. Insert the Hex. Wrench (2mm) into the nut on the Tension Band Fastener and adjust it (only counter-clockwise) as indicated by the arrow so that the outside edge of the Tension Post lines up with the outside of the P1 Post as shown in Fig. M2.
6. Remove the Hex. Wrench (2mm). Then install the Cassette Up Unit.
7 Connect the A/C plug. Then turn the Power Switch ON and push the STOP/EJECT Button to complete unloading operation sequence.
8. Remove the jumper (TP6001 - GND) and reinstall the Cabinet Parts.

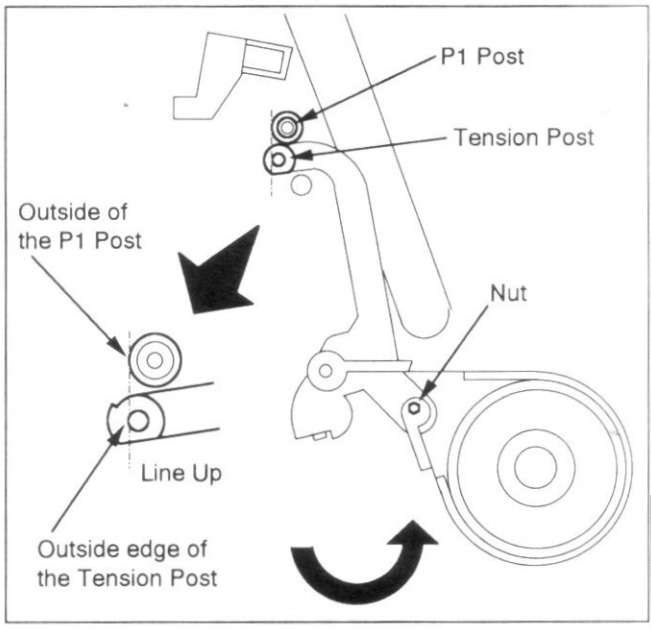


Fig. M2

3. MEASUREMENT AND ADJUSTMENT OF BACK TENSION

Purpose :
To fine adjust the Back Tension so that the tape runs stable with a constant tension.

Symptom of Misadjustment :
1) If the tape tension is less than the specified value, the tape can not come into proper contact with the Video Heads, resulting in poor picture playback.
2) If the tape tension is too high, the tape will soon be damaged.

A : Measurement Procedure

* Equipment Required :
Back Tension Meter (Made in U.S.A., Purchase Locally)
VHS Cassette Tape (120 Minute Tape)

* Specification 20 ~ 25g

Note:
Perform step 1 of Position Adjustment of Tension Post (Preliminary) before performing this adjustment.

1. Pull the Impedance Roller Unit in the direction indicated by the arrow in Fig. M3 and secure it with adhesive tape.
2. Play back a cassette tape from its beginning for approx. 10 to 20 seconds, until the tape's movement has stabilized.
3. Insert Tension Meter in tape path and confirm reading.
4. If the reading is out of specification, perform the adjustment procedure.

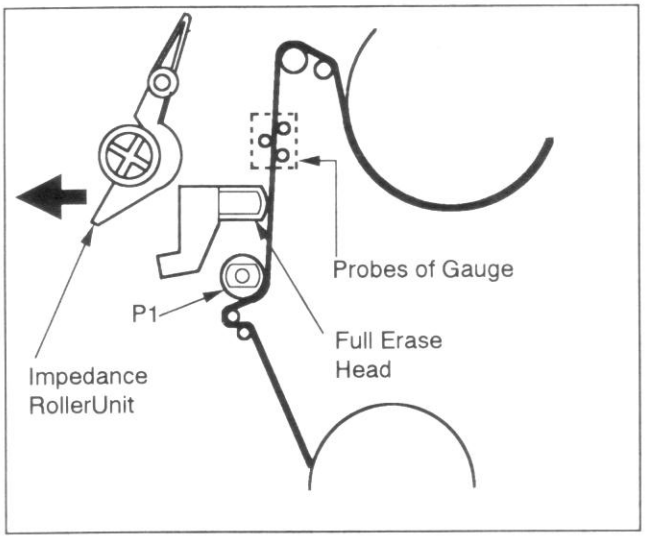


Fig. M3

Note :
1. Make sure that the three probes of the meter are all in solid contact with tape, but out of contact with any other parts while measuring.
2. It is recommended that measurements be taken three times because the tension meter is very sensitive to external vibrations.

B : Adjustment Procedure

1. Remove the Cassette Up Unit. Then re-position Tension Spring on the Tension Arm Base Teeth in either direction as indicated by the arrow to obtain the specified tension.
2. Re-position Tension Spring toward front side to increase tension, toward rear side to decrease tension.
3. Reinstall the Cassette Up Unit and verify tension with the meter once again.
4. Upon completion of adjustment, remove the adhesive tape holding the Impedance Roller Unit
5. Reinstall the the cabinet parts.

Note :
If the specified tension is not obtained even if the Tension Spring is re-positioned, replace the Tension Spring, replace the Tension Band, clean the Reel Table or make sure if there is no dust between Tension Band and Reel Table.

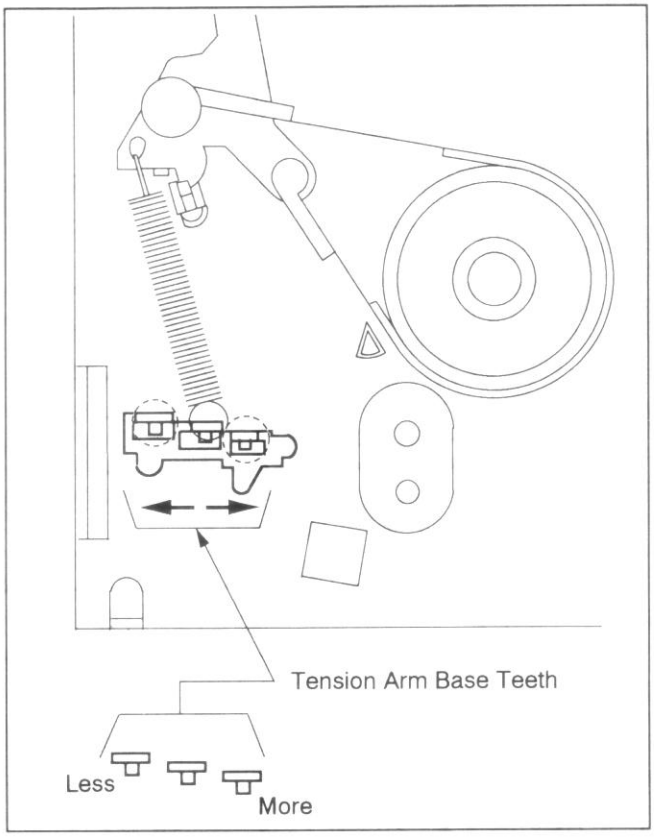


Fig. M4

4. HEIGHT ADJUSTMENT OF REEL TABLES

Purpose :
To properly align the height of the tape wound on the Supply and Take-Up Reels.

Symptom of Misadjustment :
If the height of the tape is not properly aligned, the tape will eventually be damaged.

* Equipment Required :
Post Adjustment Plate ·····(VFKS0010)
Reel Table Height Fixture ····· (VFKS0009)

* Specification ·····0 ± 0.1mm

1. Remove the Top Cover, Front Panel Ass'y, Operation Ⅰ, Ⅱ C.B.A.s and Cassette Up Unit.
2. Place the Post Adjustment Plate over the reels, and put the fixture on it. Set the fixture to zero "0" and ensure that the foot of the fixture touches the cut-out portion of the plate.

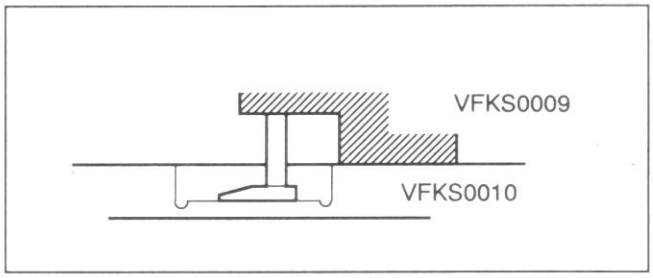


Fig. M5-1

3. Then measure the top portion of the Reel Table and compare the difference against the result of the measurement taken in the above step. Do the same for the other reel table.

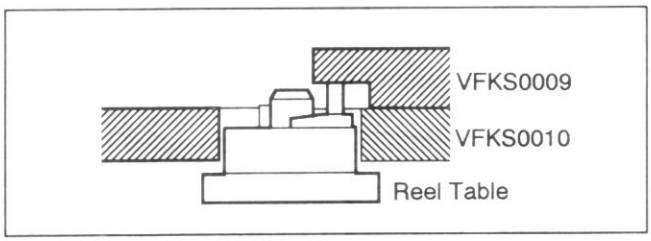


Fig. M5-2

4. If the difference is more than 0.1mm (higher or lower), adjust the height of reel table to obtain the specified height.
5. For adjustment, change the poly washer located under the reel table. (The washer is available in only one size of 0.13mm thick) Move the locking tab to remove the reel table.
6. Reinstall the Cassette Up Unit and the cabinet parts.

5. HEIGHT ADJUSTMENT OF TAPE GUIDE POSTS (PRELIMINARY ADJUSTMENT)

* Equipment Required :
  Lock Screw Wrench ..... (VFKS0032)
  Post Adjustment Plate ..... (VFKS0010)
  Reel Table Height Fixture ..... (VFKS0009)
  Post Adjustment Screwdriver .....(VFK0329)

5-A. HEIGHT ADJUSTMENT OF P2 AND P3

Purpose :
To properly align the position of the tape with the Cylinder Lead so that the tape runs with stability.

Symptom of Misadjustment :
1) Since the Envelope Waveform Signal cannot be tracked properly, the Playback picture will be poor.
2) Since the tape will not run stable, the tape will eventually be damaged.
3) Tape interchangeability is poor.

1. Remove the Top Cover, Front Panel Ass'y, Operation Ⅰ, Ⅱ C.B.A.s and Cassette Up Unit. Then install the Adjustment Plate.

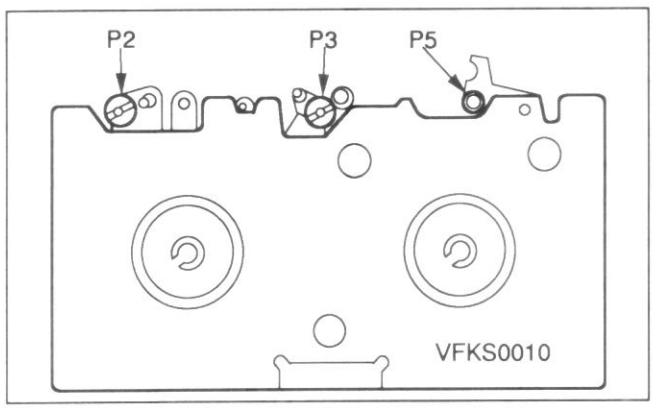


Fig. M6-1

2. First, lower all posts to match the height condition as shown in Fig. M6-2.

(The upper edge of the lower tape guide on each post should be below the bottom of the foot. Loosen Black Lock Screws located at lower portion of posts (P2 & P3) using Lock Screw Wrench, then turn the posts with Post Adjustment Screwdriver.)

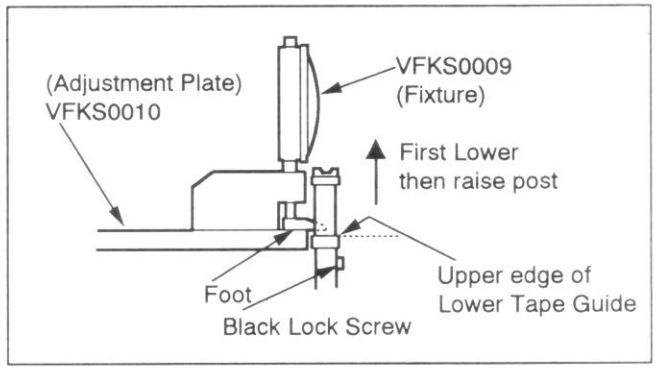


Fig. M6-2

3. Place the fixture on the Adjustment Plate and fit the foot to the Adjustment Plate as shown in Fig. M6-2.
(The foot of the fixture should be fully lowered until it touches the plate.)
4. Set the fixture to zero "0" and slowly raise the post until it just touches the foot.
When the foot touches the post, it should fit as shown in Fig. M6-3 (b). For adjustment of P2 and P3, use the Post Adjustment Screwdriver.

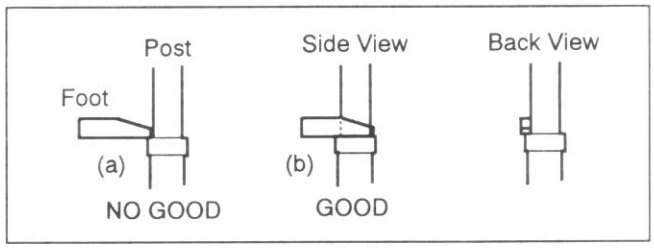


Fig. M6-3

Note:
Upon completion of adjustment, tighten the Black Lock Screws on P2 and P3 using the Lock Screw Wrench.

5-B. HEIGHT ADJUSTMENT OF P5 ARM UNIT

Purpose :
To properly align the Phase and Speed Controls during the CUE/REVIEW Modes and perform the CUE/REVIEW operations without any small additional noise in the picture.

Symptom of Misadjustment :
1) Noticeable noise appears in the picture.
2) The tape will eventually be damaged.

* Equipment Required :
  Post Adjustment Plate ..... (VFKS0010)
  Reel Table Height Fixture ..... (VFKS0009)
  Nut Driver (5.5mm) ..... Purchase Locally

* Specification : 0 (+0, − 0.08) mm

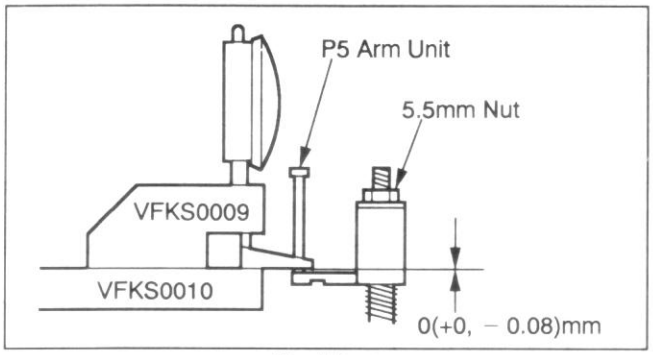


Fig. M6-4

1. Place the Post Adjustment Plate over the Reels, and put the Fixture on it. Set the Fixture to Zero "0" when the foot just touches the Post Height Adjustment Plate.
2. Slightly raise the P5 post above the plate by turning the 5.5mm Nut counterclockwise. Place the foot on the post as shown in Fig. M6-4.
3. Then slowly turn the 5.5mm Nut clockwise until the fixture reads the specified height.
4. Remove the Post Adjustment Plate. Reinstall the Cassette Up Unit and cabinet parts.

Note:
Upon completion of above procedure, play back the tape and confirm that the tape runs properly without curling between lower and upper limits of P5 Post. Also confirm that the tape is running smoothly.
If adjustment is required, slightly turn the 5.5mm Nut until the curling smoothes out.

6. TAPE INTERCHANGEABILITY ADJUSTMENT(FINAL ADJUSTMENT)

Note :
To perform these adjustment/confirmation procedures, make sure that the Tracking Control is set in the Neutral position.

* Equipment Required :
Dual Trace Oscilloscope
VHS Alignment Tape ..... (VFMS0001H6)
Post Adjustment Screwdriver ..... (VFK0329)
H – Position Adjustment Screwdriver ..... (VFKS0080)
Lock Screw Wrench ..... (VFKS0032)

6-A. CONFIRMATION OF TAPE TRAVEL

Purpose :
To make sure that the tape run is well stabilized.

Symptom of Misadjustment :
If the tape travels with instability, the tape will be damaged.

1. Play back a cassette tape and confirm that the tape travels without curling at the upper and lower guides on posts P2 and P3.

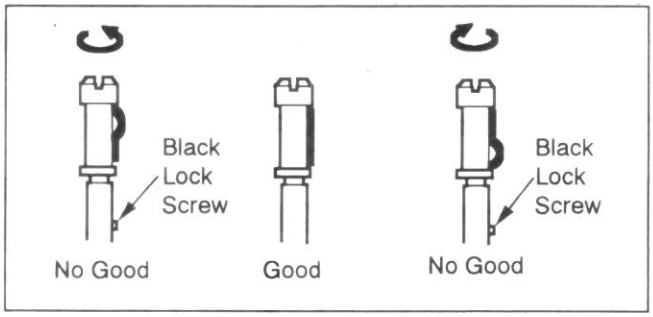


Fig. M7

2. If curling is apparent, adjust the height of posts by turning the top of post with the Post Adjustment Screwdriver. (for P2 & P3)

Note:
Before turning P2 and P3, slightly loosen the Black Lock Screw using the Lock Screw Wrench.

6-B. CONFIRMATION OF A/C HEAD HEIGHT

A/C Head Replacement Part Assembly Height has already been adjusted at the factory.

Purpose :
To make sure the tape runs properly along the Control Head.

Symptom of Misadjustment :
If the control signal is not properly picked up, Servo Operation can not be achieved. A Blue screen will be seen in Playback.

This confirmation is required when the A/C Head is replaced and for a preliminary height adjustment. For final adjustments, perform items 6-C and 6-D.

1. Looking at the lower edge of the Control Head with the T120 tape in motion, ensure that the lower edge of the tape runs 0.25mm above the lower edge of the control head.
If it doesn't, turn Black Screws (A), (B) and (C) slightly in either direction as necessary to correct it. Turn clockwise to lower the head and counterclockwise to raise it. When turning Screws (A), (B) and (C), they must be turned the same amount.

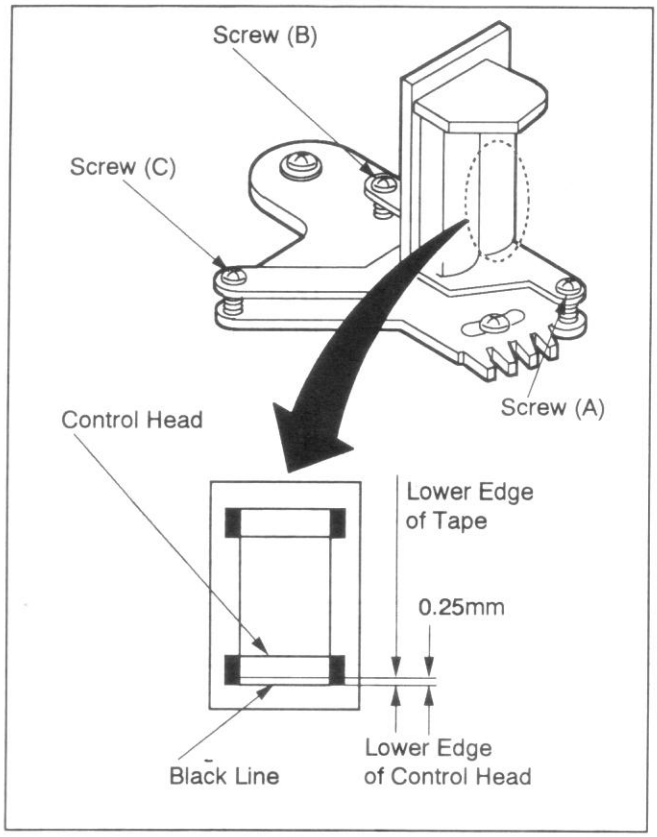


Fig. M8

6-C. CONFIRMATION OF TILT OF A/C HEAD

Purpose :

To confirm that the tape run is well stabilized. In particular, confirm that the tape properly picks up the Audio Signal at the upper part and the Control Signal at the lower part.

Symptom of Misadjustment :

If the tilt of the A/C Head is poorly adjusted, the tape will be eventually damaged. An intermitter Blue screen may be seen in Playback.

1. Play back a T120 Cassette tape and confirm that the tape runs properly between lower and upper limits of P4 post. Also confirm that the tape is running smoothly.
2. If adjustment is required, turn Black Screw (B), in Fig. M8, clockwise until curling is apparent at lower edge of P4. Then turn Black Screw (B) counterclockwise until the curling smoothes out.

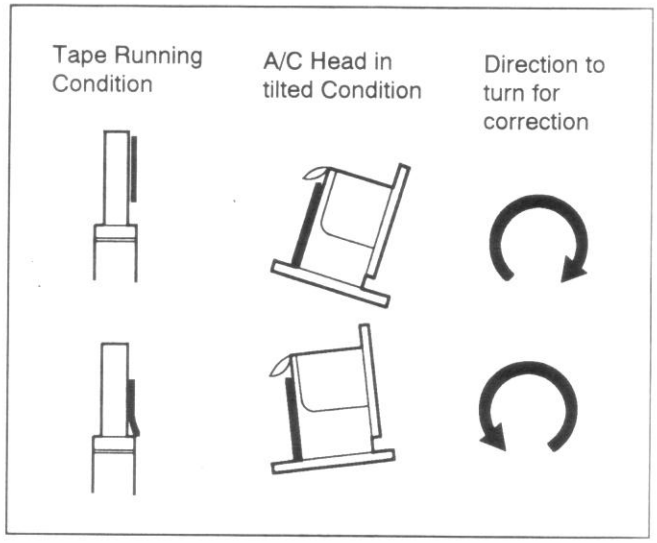


Fig. M9

6-D. HEIGHT AND AZIMUTH ADJUSTMENT OF A/C HEAD

Purpose :

To adjust the position and height of the A/C Head so that it meets the tape tracks properly.

Symptom of Misadjustment :

If the position of the A/C Head is not properly adjusted, the Audio S/N Ratio is also poor.

1. Connect the oscilloscope to TP4002 on the Audio Section of the Main C.B.A.
2. Play back the monoscope portion (6kHz, Mono) of the alignment tape (VFMS0001H6).
3. Adjust Black Screw (C) on the head base in Fig. M8 so that the output level is at a maximum.

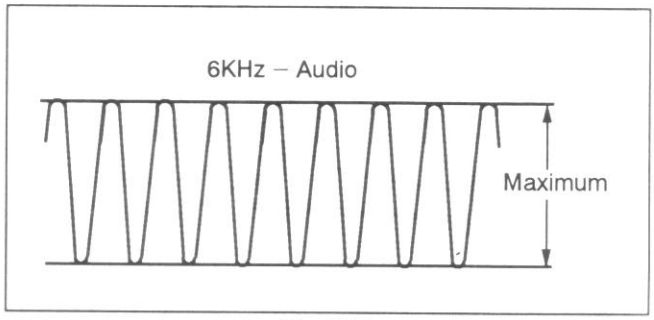


Fig. M10

4. Readjust Black Screw (A) shown in Fig. M8 for maximum output.
5. Disconnect the oscilloscope.

6-E. HORIZONTAL POSITION ADJUSTMENT OF A/C HEAD

Purpose :

To adjust the Horizontal Position of the A/C Head.

Symptom of Misadjustment :

If the Horizontal Position of the A/C Head is not properly adjusted, maximum envelope can not be obtained at the Neutral Position of the Tracking Control Circuit.

Place a jumper between TP6003 and +5V(TP6009) on the System Control Section of the Main C.B.A. to defeat Auto Tracking.

1. Eject the tape and reinsert it again, this will access the Neutral Tracking position. Connect the oscilloscope to TP3002 on the Video Signal Process Section of the Main C.B.A.
   Use TP6205 as a trigger.
2. Play back the monoscope portion of the alignment tape (VFMS0001H6) and confirm that the RF envelope appears, as in Fig. M12-1.
3. If adjustment is required, loosen Black Screw with 2 Washers (D) and tighten the Screw lightly. Set H-Position ADJ. Screwdriver into Hole (E) as shown in Fig. M11. Then slowly turn fixture either clockwise or counterclockwise so that the envelope is at a maximum.

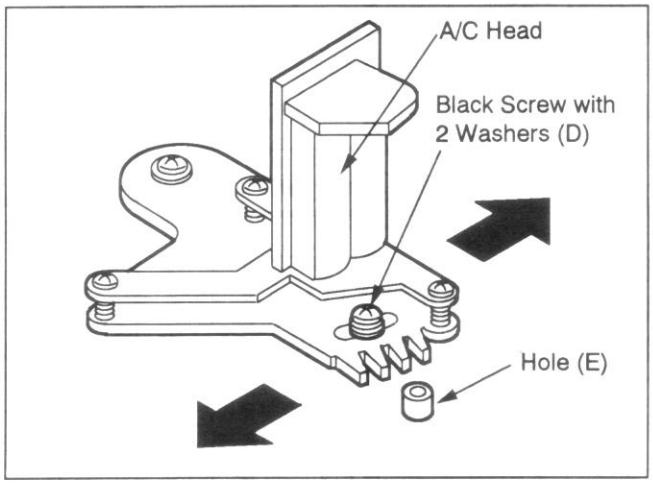


Fig. M11

6-F. CONFIRMATION/ADJUSTMENT OF ENVELOPE OUTPUT

Purpose :

To achieve a satisfactory picture and secure precise tracking.

Symptom of Misadjustment :

If the envelope is output poorly, much noise will appear in the picture. Then the tracking will lose precision and the playback picture will be distorted by any slight variation of the tracking control circuit.

Place a jumper between TP6003 and +5V(TP6009) on the System Control Section of the Main C.B.A. to defeat Auto Tracking.

1. Eject the tape and reinsert it again, this will access the Neutral Tracking position. Connect the oscilloscope to TP3002 on the Video Signal Process Section of the Main C.B.A. Use TP6205 as a trigger.
2. Play back the monoscope portion of the alignment tape (VFMS0001H6) and adjust the height of posts P2 and P3 watching the scope display so that the envelope becomes as flat as possible.
   (V1/V-max $\geqq$ 0.7, V2/V-max $\geqq$ 0.8)

   If adjustment is required, turn top of post with Post Adjustment Screwdriver. For adjustment of P2 and P3, refer to Item 8-A and it's Note.

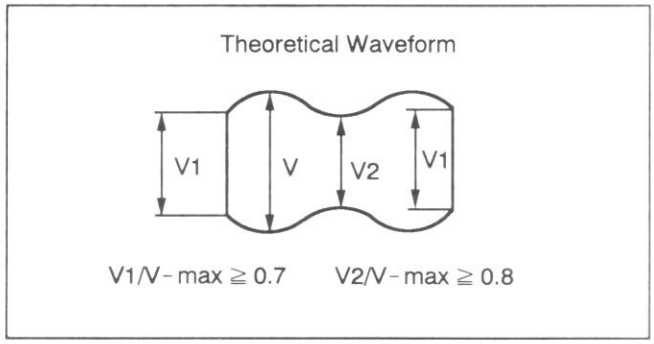


Fig. M12-1

3. When the scope display is as shown in Fig. M12-2, adjust the height of P2 so that the waveform looks like Fig. M12-4.

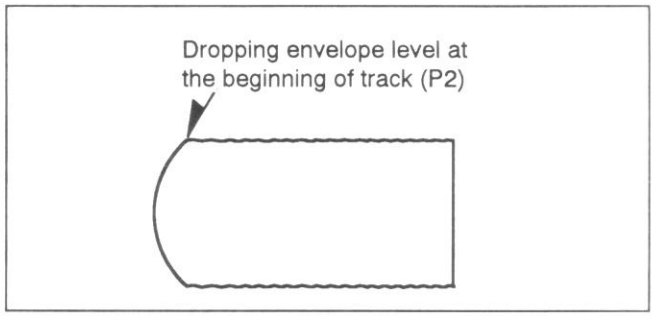


Fig. M12-2

4. When the scope display is as shown in Fig. M12-3, adjust the height of P3 so that the waveform looks like Fig. M12-4.

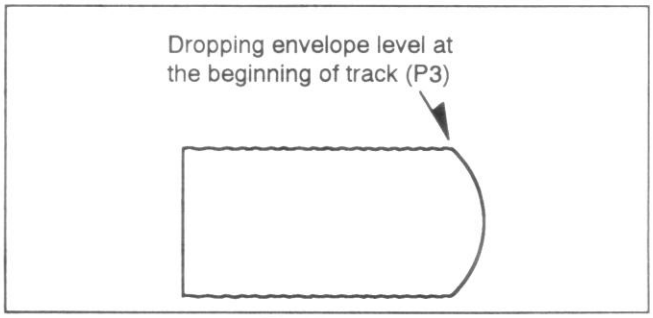


Fig. M12-3

5. When P2 and P3 are adjusted properly, there is no Envelope Drop at the beginning or end of the track as shown in Fig. M12-4. Remove the jumper wire.

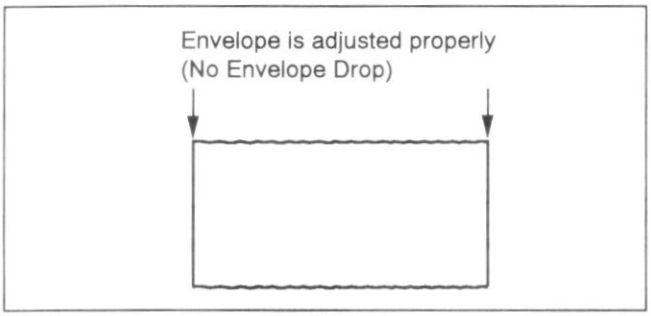


Fig. M12-4

Note:

Upon completion of adjustment of P2 and P3, tighten the Black Lock Screws on P2 and P3 using the Lock Screw Wrench. Then confirm the Horizontal Position of A/C Head by pushing the Tracking Control Up or Down Buttons alternately, using the IR Wireless Transmitter Unit, to check the symmetry of the envelope. And if required, perform "Horizontal Position Adjustment of A/C Head".

7. ADJUSTMENT OF FG HEAD GAP

Purpose :

To properly pick up the FG Signal.

Symptom of Misadjustment :

If the FG Signal is not properly picked up, Servo Operation can not be achieved.

* Equipment Required :
  Oscilloscope
  Fine Adjustment Screwdriver·····(VFK0330)

* Specification : 0.13 ± 0.02 mm

1. Remove the VCR Chassis Unit and then place it upside down.
2. Remove the Main C.B.A.
3. Slightly loosen 2 Black Screws (A) and set the Fine Adjustment Screwdriver into Hole (B) as shown in Fig. M13. Turn screwdriver clockwise until the FG Head touches the rotor. Then turn it slightly counterclockwise to the clearance as specified.
4. Tighten 2 Black Screws (A) in Fig. M13.
5. Reinstall the Main C.B.A.

Note :

1. Do not touch the outside circumference of the rotor surface with any tool and keep magnetic material away from the rotor magnet (especially metal particles).
2. Upon completion of above procedure, confirm that the FG Head output level is more than 10mVp-p, see preparation next. If the level is not more than 10mVp-p, re-adjust the FG Head Gap so that the FG Head output level is more than 10mVp-p.

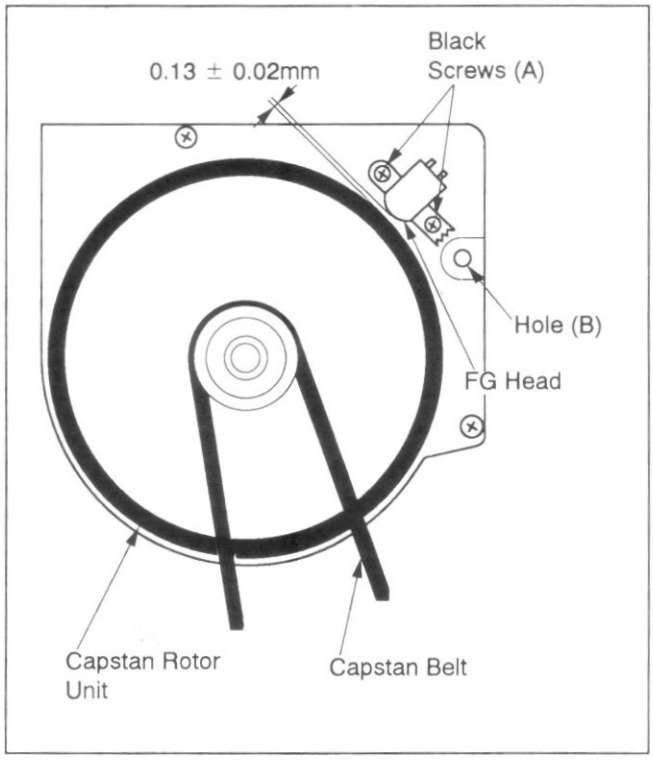


Fig. M13

(Preparation)

1) Supply a Video Signal to the Video Input Jack on the rear of the deck.
2) Insert a cassette tape and place the unit in SLP recording Mode.
3) Connect the oscilloscope to Pin 12 and 13 of P2502 on the Capstan Motor Drive C.B.A.

8. REPLACEMENT OF CAPSTAN ROTOR OR STATOR UNIT

1. Remove the Capstan Belt (Fig. M13).
2. In the order described in the Disassembly and Assembly Procedures of Mechanism section, remove the Motor Block Assembly.
3. Carefully pull out the Capstan Rotor Unit, taking care so as not to lose the 2 Dust Seals as shown in Fig. M14.

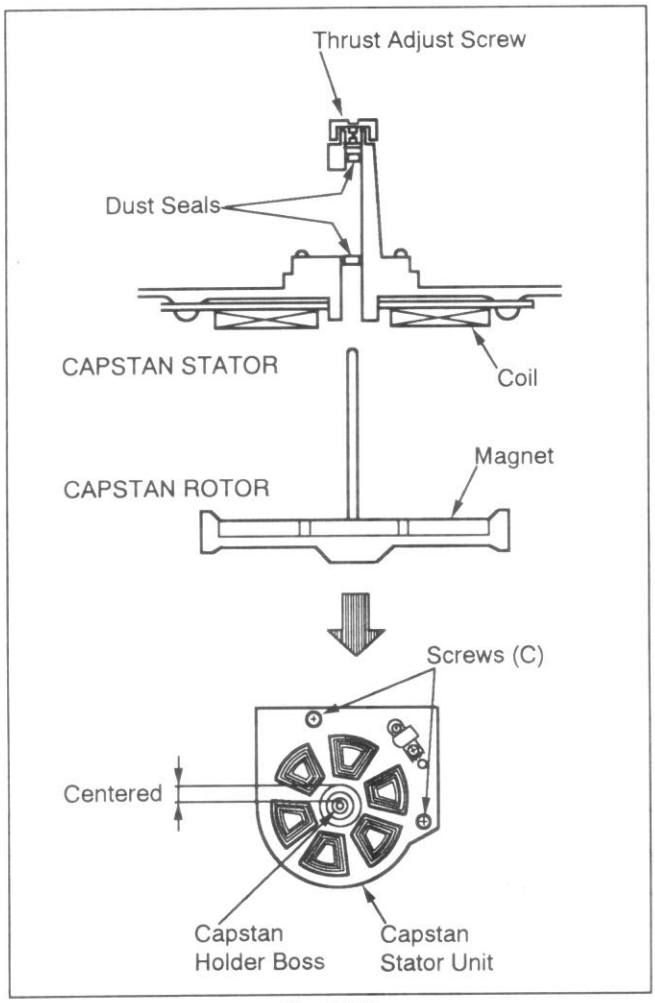


Fig. M14

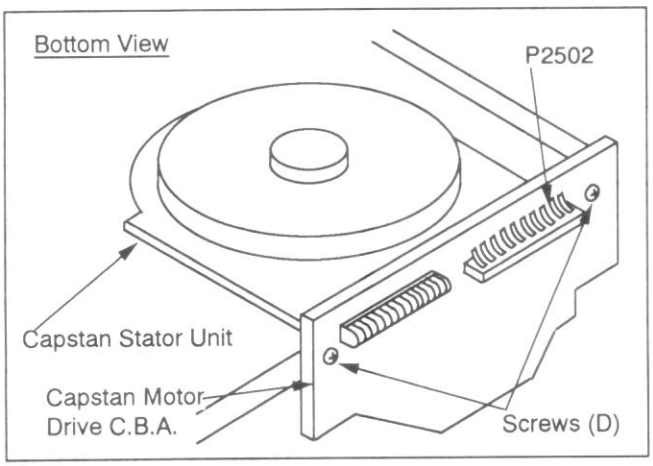


Fig. M15

4. Carefully unsolder P2502 on the Capstan Motor Drive C.B.A. and then remove the Capstan Motor Drive C.B.A. by removing 2 Screws (D) in Fig. M15.
5. Remove 2 Screws (C) and then lift the Capstan Stator Unit.
6. Replace the new Capstan Stator Unit and then tighten 2 Screws (C).

Note:
When reinstalling the Capstan Stator Unit, the Capstan Holder Boss must be centered within the hole in the Capstan Stator Unit.

7. Before replacement of new Capstan Rotor Unit, loosen the Thrust Adjust Screw completely.
8. Replace the new Capstan Rotor, carefully inserting the Dust Seals as shown in Fig. M14.

Note :
1) The Capstan Rotor Unit is supplied as a replacement part in a complete unit with a spring loaded Capstan Pulley.
2) Hold the new Capstan Rotor Unit firmly, when replacing it, so the rotor will not be pulled toward the stator too quickly (due to magnetic force). Placing some paper on the coils before rotor installation may prevent accidental damage to the coils if the above caution is not observed.
3) During replacement, do not touch the Capstan Shaft with any hard material like drivers or tweezers.

9. Re-install the Capstan Motor Drive C.B.A. by tightening 2 Screws (D). Then carefully solder P2502 and re-install the Motor Block Ass'y.

····ADJUSTMENT OF THRUST ADJUST SCREW AND DUST SEALS····

10. Re-install the Capstan Belt and while exerting pressure to turn the Clutch Unit, tighten the Thrust Adjust Screw slowly until the Capstan Rotor just starts turning.
11. At the point where the Capstan Rotor starts turning, tighten the Thrust Adjust Screw another 180° CW.
12. Upon completion of above procedure, confirm that this Dust Seals are positioned as shown in Fig. M16. And then, wipe off the Capstan Shaft to remove oil, grease and dust.

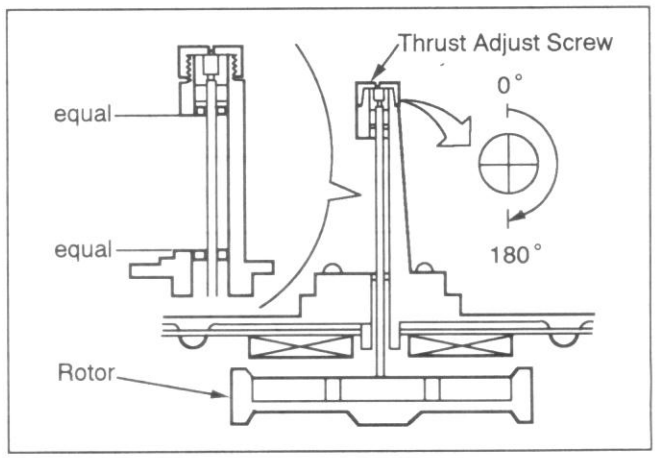


Fig. M16

9. DISASSEMBLY/ASSEMBLY PROCEDURES OF MECHANISM

This procedure starts with the condition that the cabinet parts, Main C.B.A. and Cassette Up Unit have been removed. Also, all the following procedures for adjustment and part replacement should be performed in EJECT Mode. When reassembling, perform the step(s) in the reverse order.

STEP /LOC. No.	START -ING No.	PART		REMOVAL		INSTALLATION
				Fig. No.	REMOVE * UNHOOK/UNLOCK /RELEASE /UNPLUG /UNSOLDER	ADJUSTMENT #CONDITION
①	1	PINCH CAM CAP	T	DM1 DM3	⚷(L-1)	.....
②	1	PRESSURE ROLLER ARM UNIT	T	DM1 DM3	.....	(+) < Note 1 >
③	1	P5 SECTOR GEAR	T	DM1 DM4	(C-1), < Note 2 >	(+) See, Alignment Procedure for Mechanism Item 10-2.
④	3	PINCH CAM	T	DM1 DM3	.....	(+) See, Alignment Procedure for Mechanism Item 10-2.
⑤	4	P5 ARM UNIT	T	DM1 DM4	(N-1), (W-1), ⚷(P-1)	(+) See, Height Adjustment P5 Arm Unit.
⑥	6	A/C HEAD UNIT	T	DM1 DM5	(S-1), (S-2), 3(W-2), (W-3), ⚷P1541	(+) See, Horizontal Position Adjustment of A/C Head.
⑦	7	OPENER ANGLE	T	DM1 DM6	(S-3), (S-4), (S-5)	.....
⑧	7	CAM FOLLOWER ARM UNIT	T	DM1 DM6	⚷(L-2)	(+) < Note 3 > See, Installation Procedure of CAM FOLLOWER ARM UNIT Item 10-4.
⑨	9	BRAKE ASS'Y	T	DM1 DM7	⚷2(P-2), ⚷(P-3), ⚷2(L-3), ⚷2(L-4)	(+) See, Setting Condition in Fig. DM7.
⑩	10	TENSION ARM UNIT	T	DM1 DM8	⚷(P-4), ⚷(L-5)	(+) See, Position Adjustment of Tension Post.
⑪	11	TAKEUP REEL TABLE UNIT	T	DM1	⚷(L-6)	(+) < Note 4 > See, Height Adjustment of Reel Tables.
⑫	12	SUPPLY REEL TABLE UNIT	T	DM1	⚷(L-7)	
⑬	13	CASSETTE DOWN DETECT PIECE	B	DM2	.....	.....
⑭	14	MOTOR BLOCK ASS'Y	B	DM2 DM9	Unsolder, 2(S-6)	.....

STEP LOC/ No.	START -ING No.	PART		REMOVAL		INSTALLATION
				Fig. No.	REMOVE * UNHOOK /UNLOCK/RELEASE /UNPLUG /UNSOLDER	ADJUSTMENT #CONDITION
⑮	15	CLUTCH UNIT	B	DM2 DM10	(C-2), < Note 2 > Capstan Belt	(+) ----------
⑯	16	P.C.B. BRACKET	B	DM2	(S-7)	----------
⑰	14	SECONDARY ROD UNIT	B	DM2 DM11	♯(P-5)	(+) ----------
⑱	17	MAIN ROD	B	DM2 DM12	(C-3), ♯2(L-8) < Note 2 >	(+) See, Alignment Procedure of Mechanism Item 10-5.
⑲	18	LOADING ARM T UNIT	B	DM2 DM13	----------	(+) See, Alignment Procedure of Mechanism Item 10-3.
⑳	18	LOADING ARM S UNIT	B	DM2 DM13	♯(L-9)	
㉑	21	P1 ROLLER	T	DM1	(C-4) < Note 2 >	----------
㉒	3	CAPSTAN HOLDER UNIT	T	DM1	3(S-8)	(+) See, Replacement of Capstan Rotor or Stator Unit.
㉓	23	CENTER BLOCK UNIT	T	DM1	2(S-9)	----------
㉔	24	CYLINDER BASE	T	DM1 DM15	3(S-13)	(+) ----------
㉕	24	D.D. CYLINDER UNIT	B	DM2 DM15	3(S-11), 2(S-12), Unsolder, Head Amp Unit	----------
㉖	14	CAPSTAN ROTOR UNIT	T	DM2 DM14	----------	See, Replacement of Capstan Rotor or Stator Unit.
㉗	26	CAPSTAN STATOR UNIT	T	DM2 DM14	3(S-14), Unsolder	(+) See, Replacement of Capstan Rotor or Stator Unit.
㉘	24	LOADING POST BASE T UNIT	T	DM1	Slide to rear to remove	(+) ----------
㉙	24	LOADING POST BASE S UNIT	T	DM1	Slide to rear to remove	

List of Abbreviations:
T= Top; B= Bottom
(P-1)=Spring (P-1); 3(S-1)=3 Screws (S-1);
3(W-1)=3 Washers (W-1); (C-1)=Cut Washer(C-1);
(N-1)=Nut (N-1); 2(L-1)=2 Locking Tabs (L-1)
(+) : Refer to Exploded Views for Lubrication information.

TOP VIEW

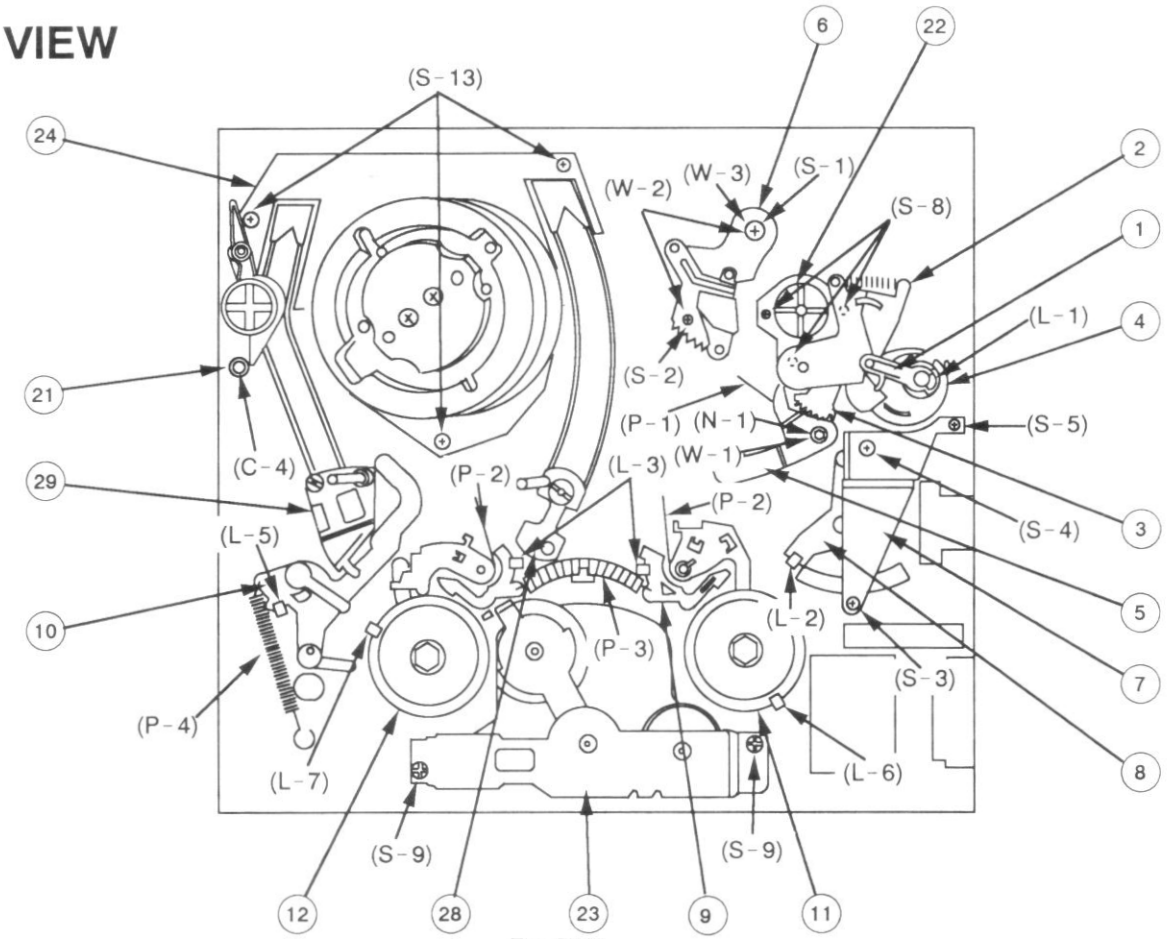


Fig. DM1

BOTTOM VIEW

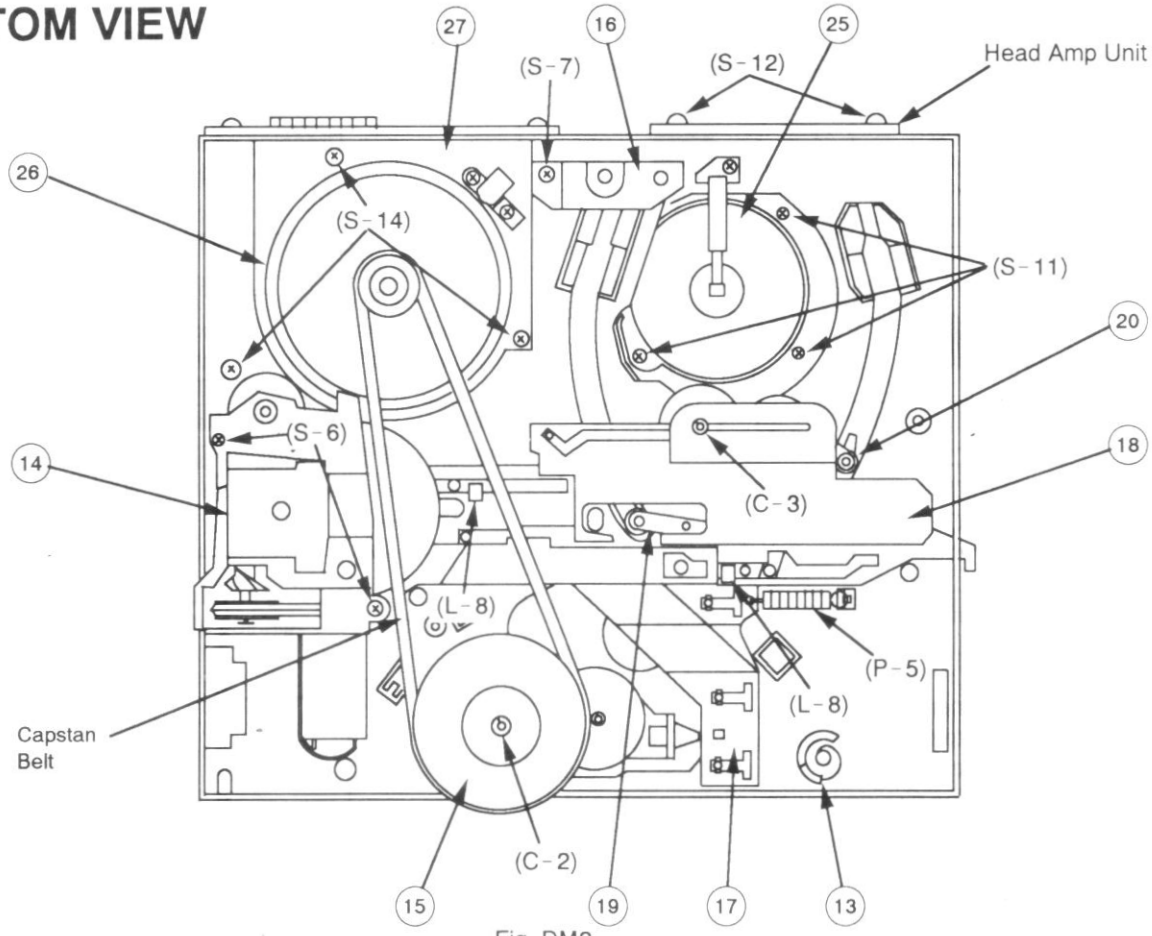


Fig. DM2

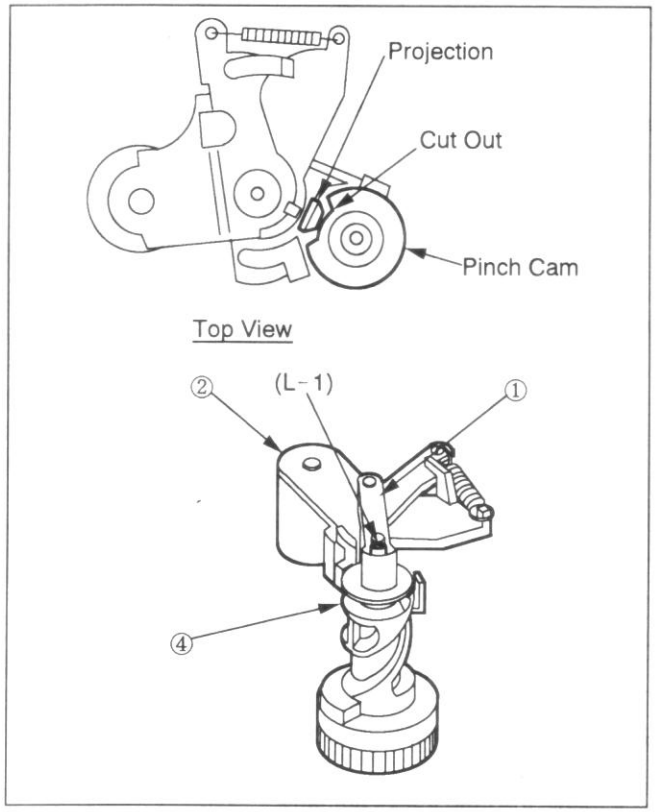


Fig. DM3

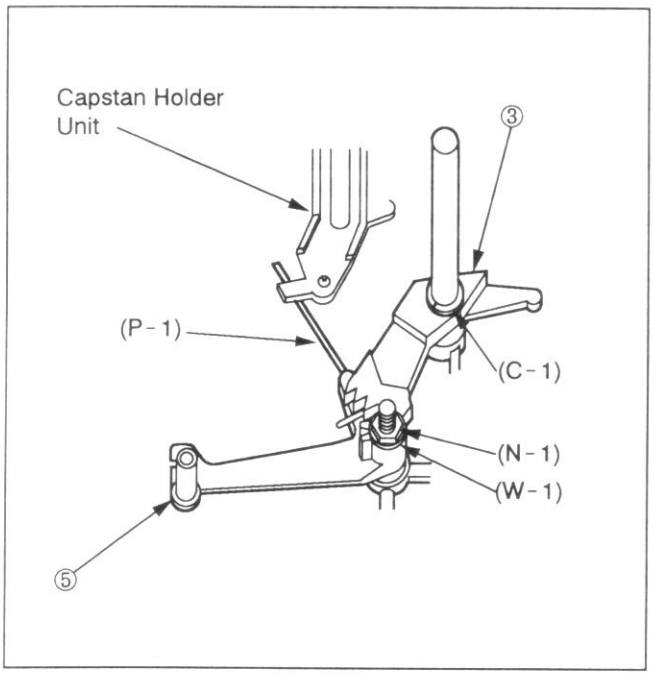


Fig. DM4

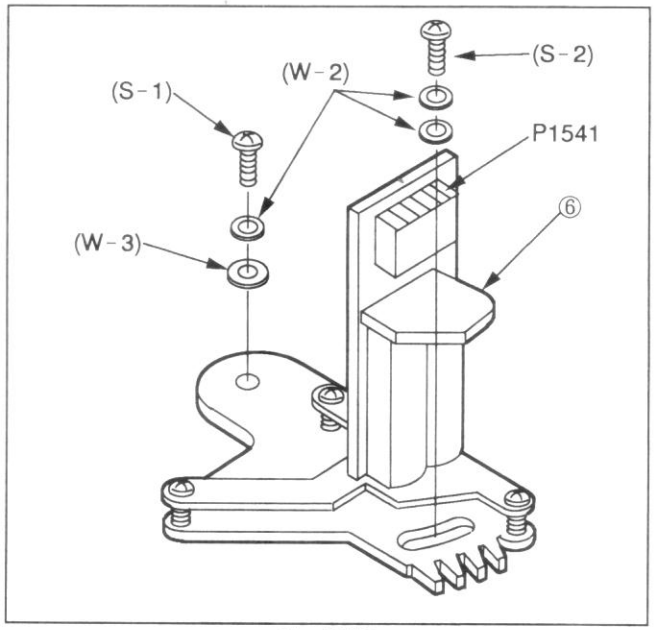


Fig. DM5

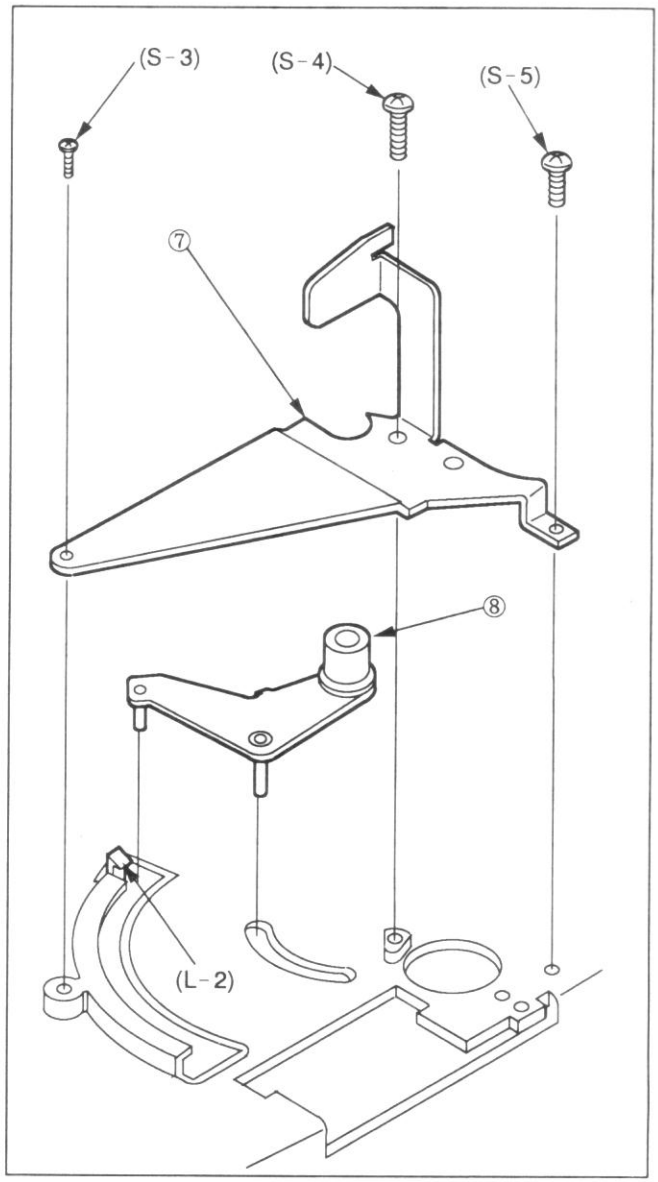
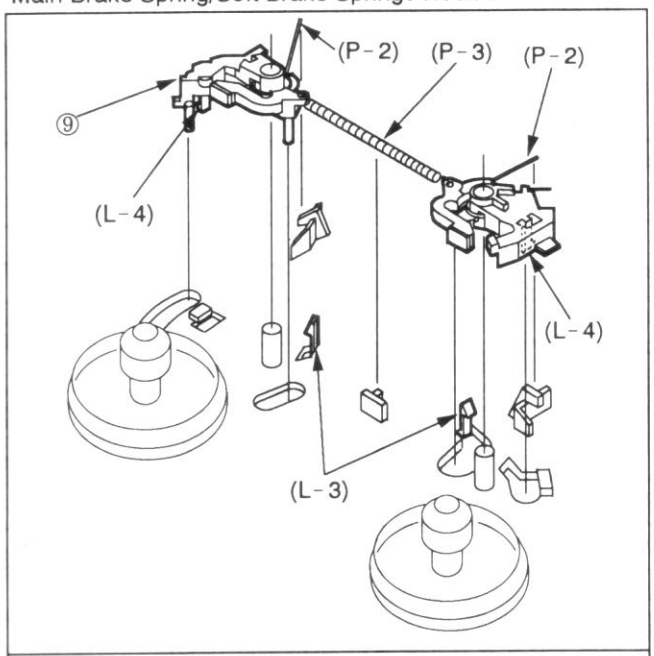


Fig. DM6

Main Brake Spring/Soft Brake Springs Hook Positions



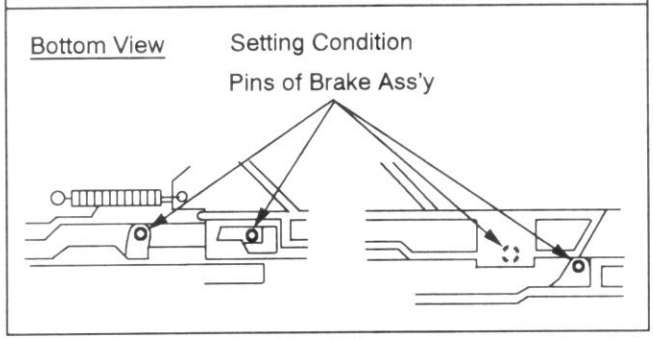


Fig. DM7

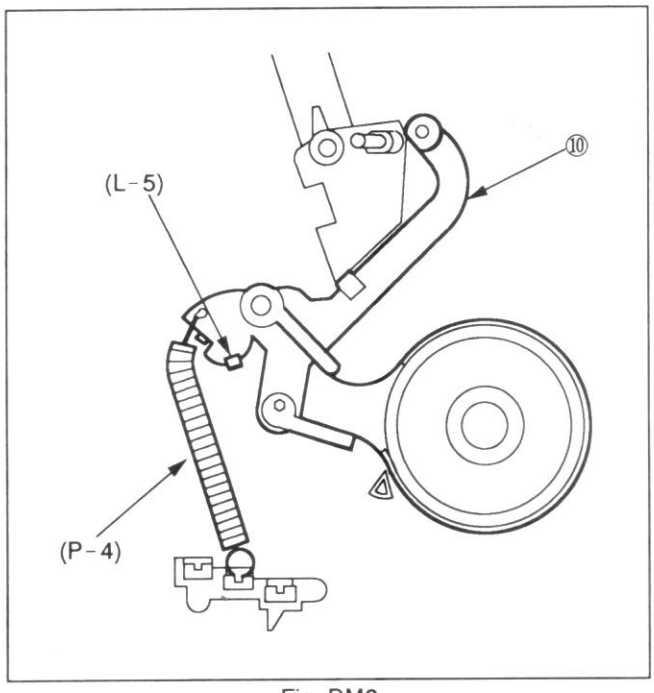


Fig. DM8

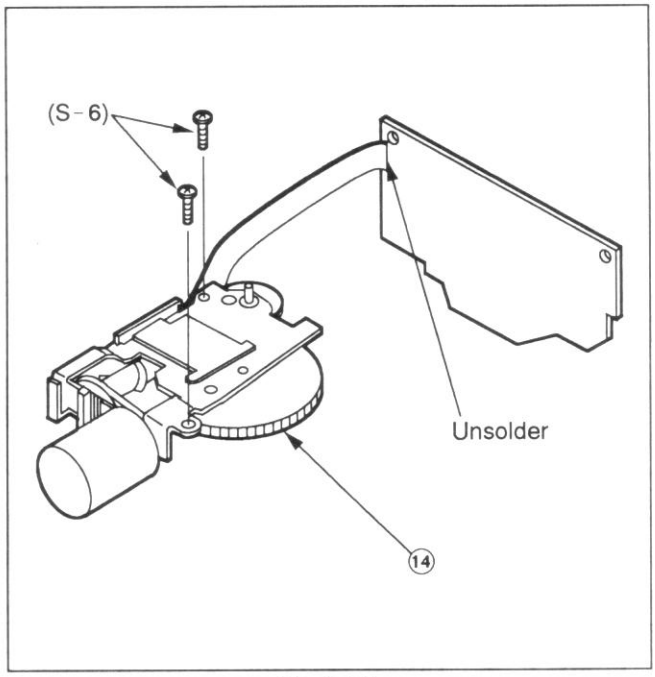


Fig. DM9

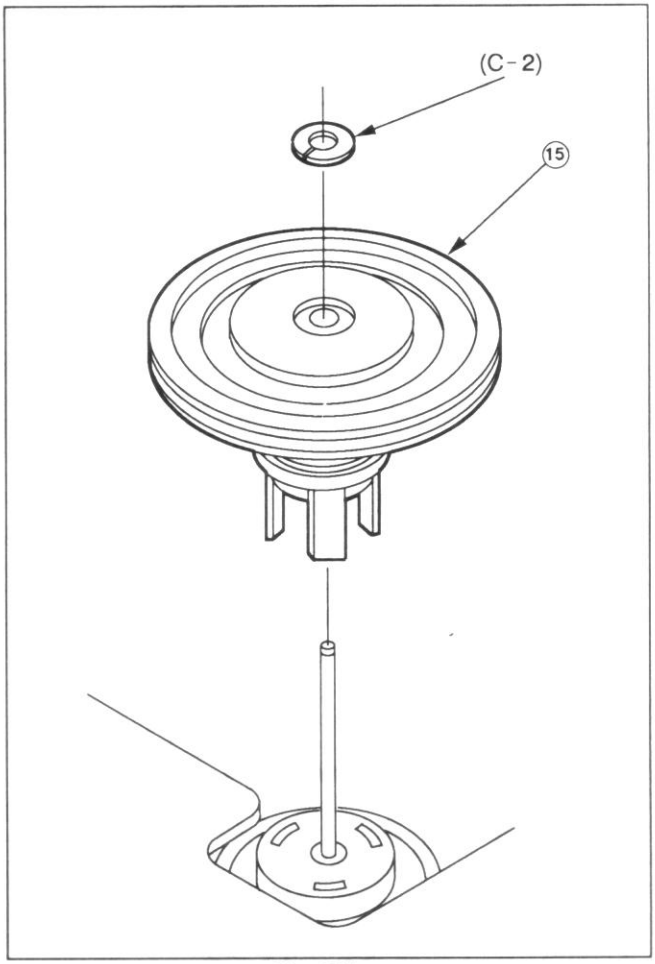


Fig. DM10

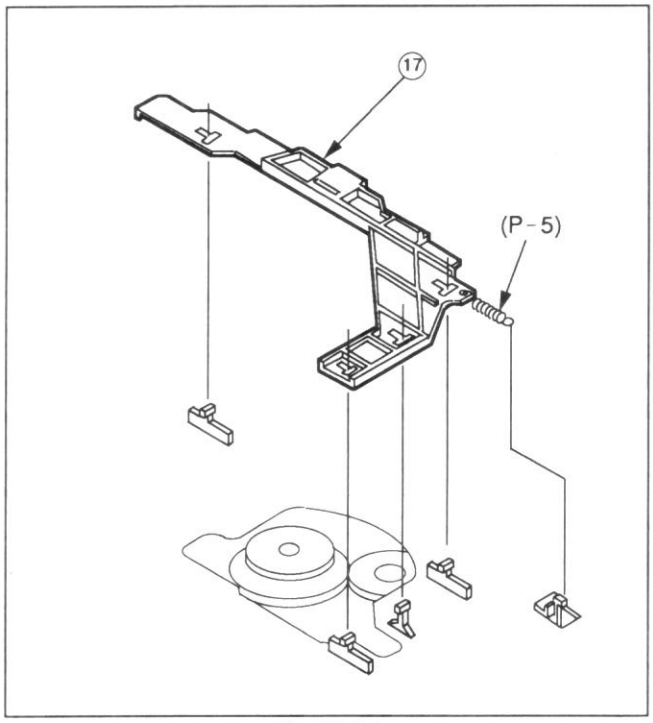


Fig. DM11

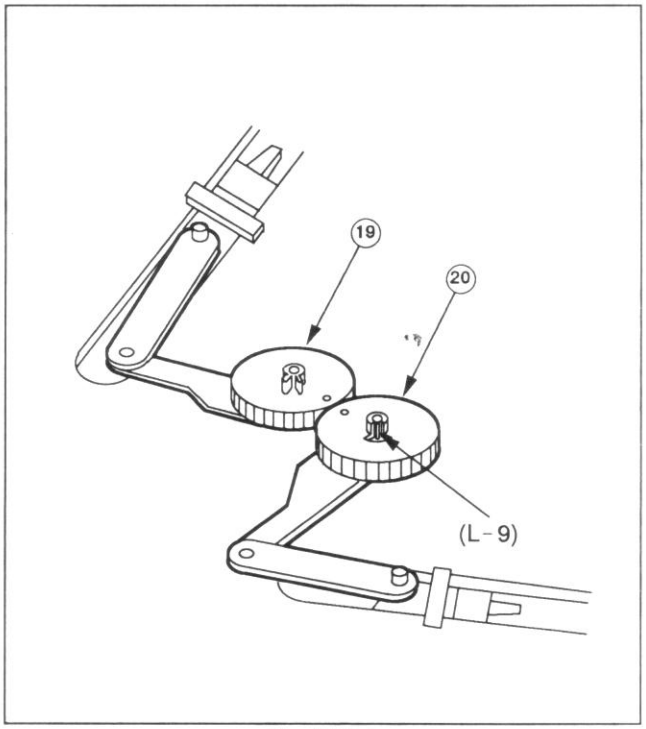


Fig. DM13

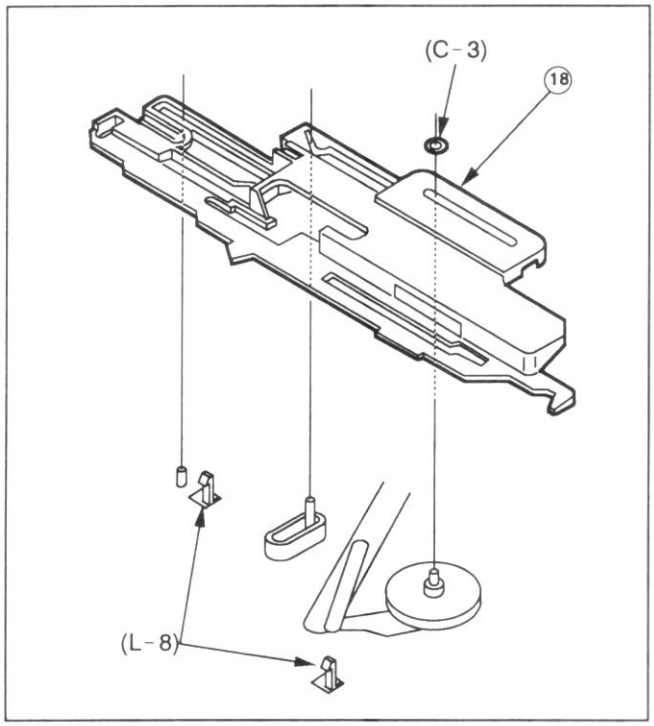


Fig. DM12

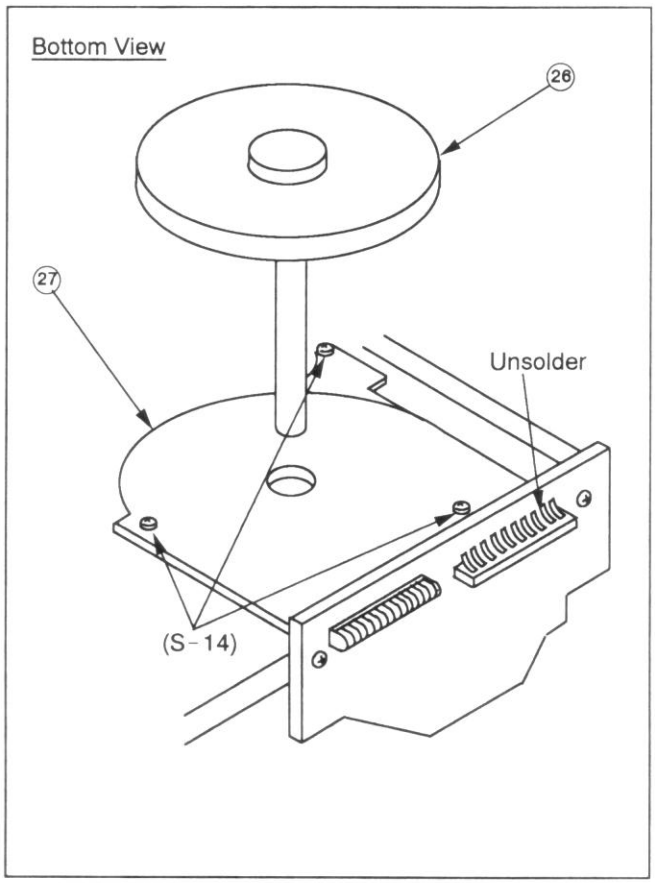


Fig. M14

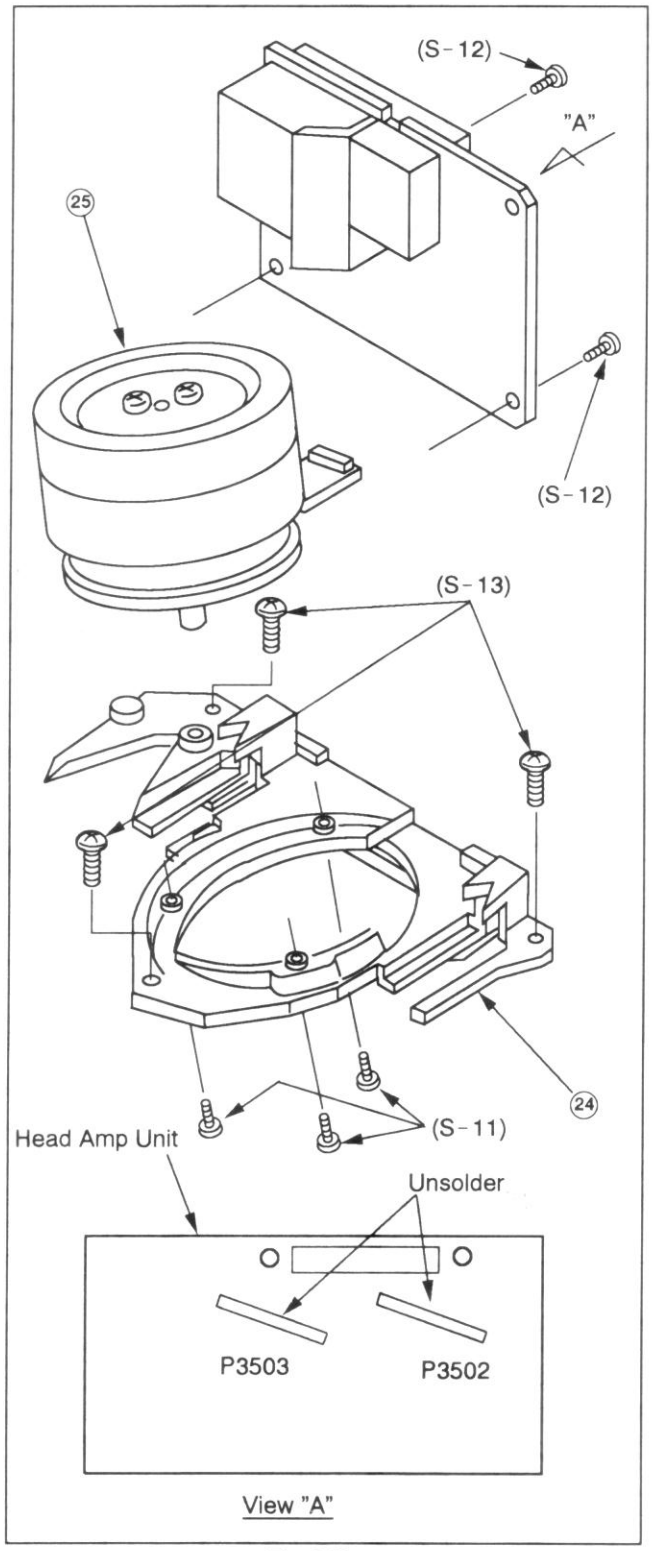


Fig. DM15

Reference <Notes> in Table 9 :

1. Before removing Pressure Roller Arm Unit, turn Worm Unit of Motor Block Ass'y. Then align the projection of Pressure Roller Arm Unit and the cut out portion of Pinch Cam.
2. This cut washer is not reusable. If removed, install a new one.
3. Install the Cam Follower Arm Unit so that the pin on the Cam Follower Arm Unit meets the inner slot of the Motor Block Ass'y.
4. When reinstalling the Supply and Takeup Reel Tables, clean the rotating surface of them with a soft cloth.

10. ALIGNMENT PROCEDURES OF MECHANISM

The mechanism of this model is mostly engaged to the System Control Circuit through the Mode Select Switch. Therefore the relation between Mode Select Switch and the Cam Gear decides all further mechanical movement of the mechanical parts such as levers, gears, rollers and so on. For specific removal and installation procedures, refer to the Disassembly / Assembly Procedures on page 1-2-13.
If these parts are not properly aligned and only off by one tooth, the unit will be unloaded or stopped. It may result in damage to the mechanical or electrical parts. This mechanical adjustment is performed in the Eject Mode. The details concerning mechanical condition will be described later.

Important Note:

All through hole alignments must be made precisely so that the complete procedure will exactly align the gear teeth. If the alignment is off by only one tooth then the mechanism will not operate properly.

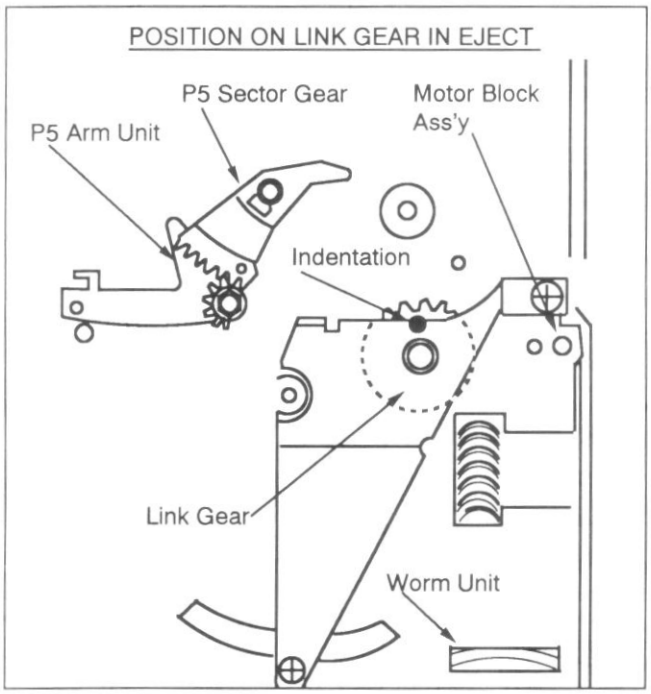


Fig. A1

1. The position of the Indentation on Link Gear after removing the Cassette Up Unit on the Eject Mode is the Eject Position as shown in Fig. A1.

10-1. ALIGNMENT PROCEDURES OF LINK GEAR,CAM GEAR AND MODE SELECT SWITCH

1. Install the Cam Gear so that the Indentation on the Cam Gear aligns with the Indentation on the Link Gear.
2. Install the Mode Select Switch so that the Indentation on the Mode Select Switch aligns with the Indentation on the Cam Gear.

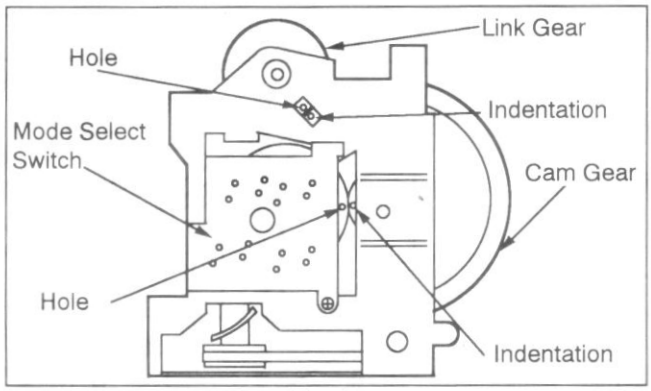


Fig. A2

10-2. ALIGNMENT PROCEDURES OF P5 ARM UNIT AND P5 SECTOR GEAR, PINCH CAM AND LINK GEAR

1. When installing Pinch Cam, confirm the Link Gear of Motor Block Ass'y is in Eject Position.
2. Install the P5 Sector Gear and Pinch Cam simultaneously so that the last tooth on P5 Arm Unit aligns with hole on P5 Sector Gear and hole on Pinch Cam aligns with Indentation on Link Gear.

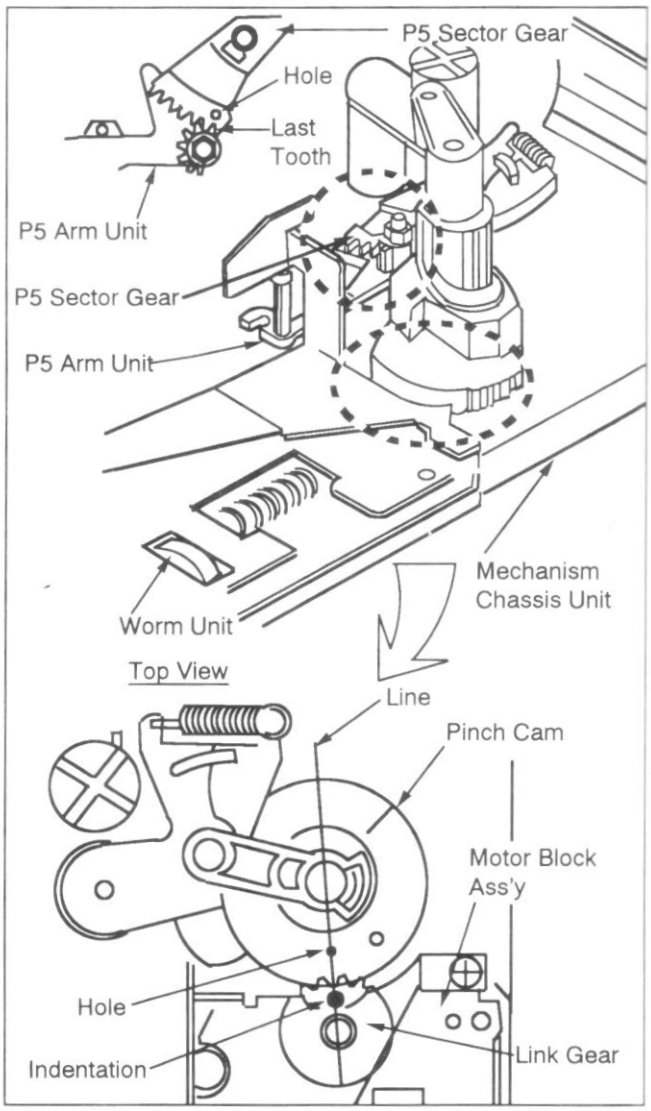


Fig. A3

10-3. ALIGNMENT PROCEDURES OF LOADING ARM T UNIT AND LOADING ARM S UNIT

1. Set the P2 and P3 posts to unloading position. Then install the Loading Arm T Unit and Loading Arm S Unit so that the hole on Loading Arm T Unit is exactly in line with the hole on Loading Arm S Unit.

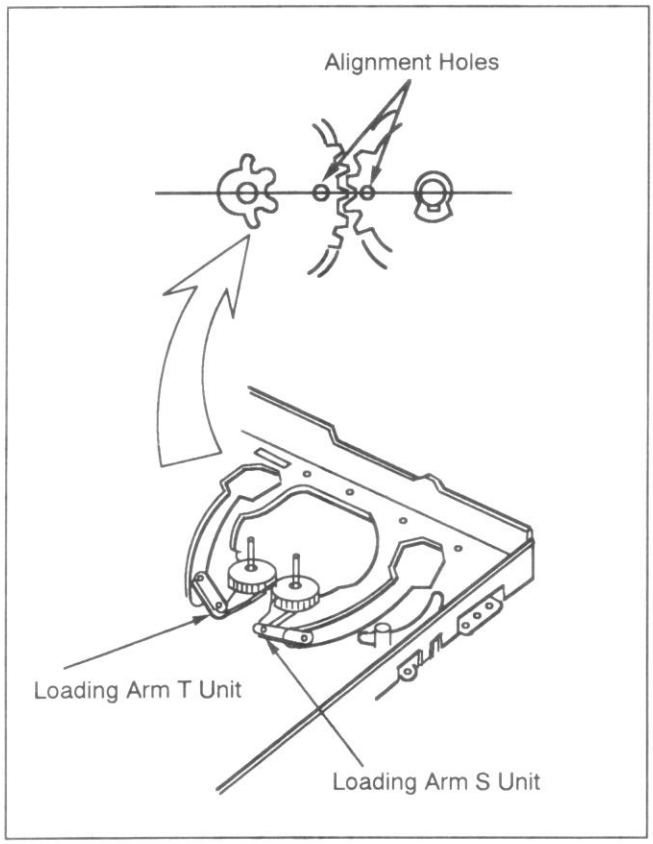


Fig. A4

10-4. INSTALLATION PROCEDURES OF CAM FOLLOWER ARM UNIT

1. Confirm the Cassette Up Unit in the Eject Position.
2. Then install the Cam Follower Arm Unit, as shown in Fig. A5.
3. Confirm Shaft A is installed into the slot of Main Rod.
4. Confirm Shaft B is installed into the arrow portion of groove of the gear on Motor Block Ass'y.

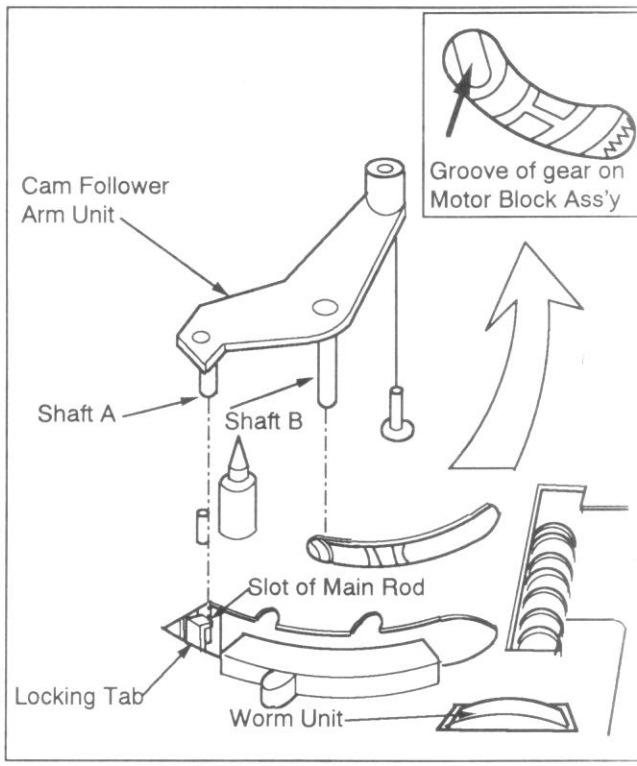


Fig. A5

10-5. ALIGNMENT PROCEDURES FOR MAIN ROD

1. Install the Main Rod so that the line of the Main Ro aligns with Shaft of Loading Arm T Unit.

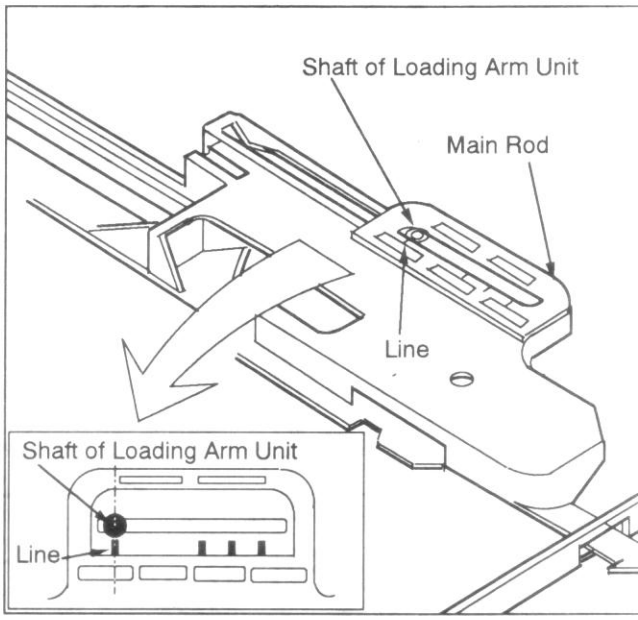


Fig. A6

11. DISASSEMBLY / ASSEMBLY AND ADJUSTMENT OF CASSETTE UP UNIT

When reassembly, perform the steps in the reverse order.

STEP / LOC. No.	START -ING No.	PART		REMOVAL Fig. No.	REMOVAL REMOVE * UNHOOK/UNLOCK/RELEASE	INSTALLATION ADJUSTMENT # CONDITION
①	1	TOP PLATE	T	DA1	2 (S - 1), Grounding Plate, * 4 (L - 1)	.....
②	2	SUB PLATE (R)	R	DA2	* 4 (L - 2)	.....
③	3	WIPER ARM (L)	L	DA3	* (L - 6) Wiper Arm Spring	(+) < Note 1 >
④	2	MAIN SHAFT UNIT	T	DA1	.....	(+) < Note 2 >
⑤	2	CASSETTE GUIDE	T	DA1	.....	.....
⑥	2	HOLDER GUIDE (L)	C	DA4	* 2 (L - 8)	.....
⑦	2	HOLDER GUIDE (R) UNIT	C	DA4	* 2 (L - 9)	.....
⑧	2	SET LEVER (L)	C	DA4	* 2 (L - 10) Set Lever Spring	< Note 3 >
⑨	2	WIPER ARM (R)	R	DA2	* (L - 3)	Align the hole. < Note 4 >
⑩	8	GENEVA GEAR	R	DA2	* (L - 7)	
⑪	2	CASSETTE DOOR LEVER	R	DA2	* (L - 11)	(+) .....
⑫	2	WORM WHEEL	R	DA2	* (L - 5)	(+) Hole at Bottom

(Top)

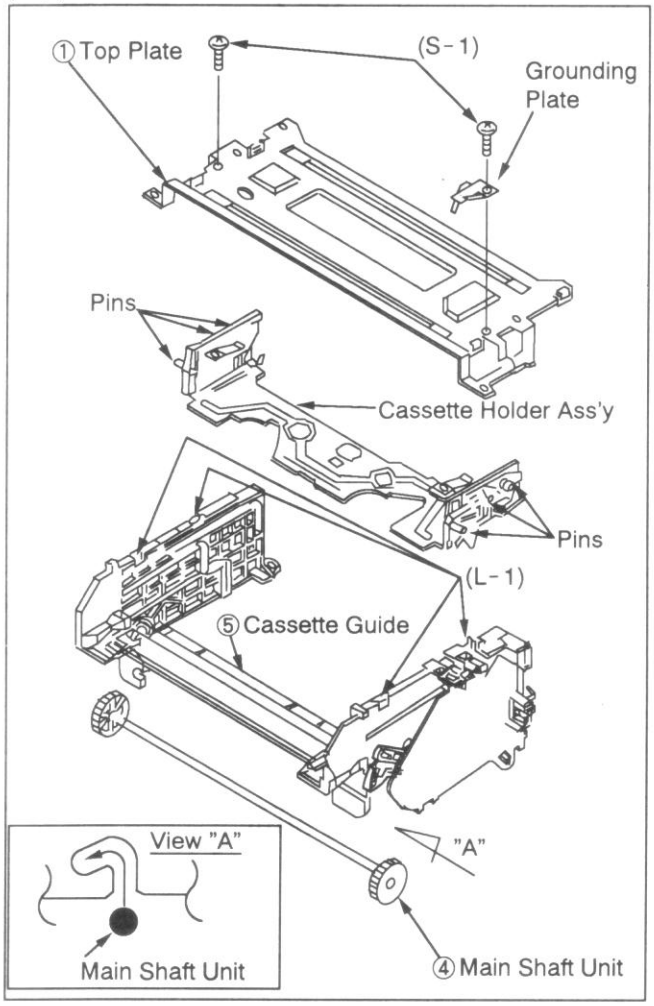


Fig. DA1

List of Abbreviations:

T= Top, R = Right, L=Left, C= Cassette Holder Ass'y;
3(L-1)= 3 Locking Clips(L-1)
(+) Refer to Exploded Views for Lubrication Information.

Reference <Notes> in Table 11:

1. When installing Wiper Arm (L) onto Side Plate (L), put the slot of Wiper Arm (L) into pin of Cassette Holder Ass'y on Eject Position.
2. When installing the Main Shaft Unit, as shown in Fig DA1, install Main Shaft Unit in the direction of the arrow.
3. When installing Set Lever(L), as shown Fig. DA4, fit the holes on Set Lever with hook of Holder Guide (L). Then hook the Set Lever Spring on each ⓓ and ⓔ.
4. When installing Wiper Arm (R) onto Side Plate (R), put the slot of Wiper Arm (R) into pin of Cassette Holder Ass'y on Eject Position.

(Right Side)

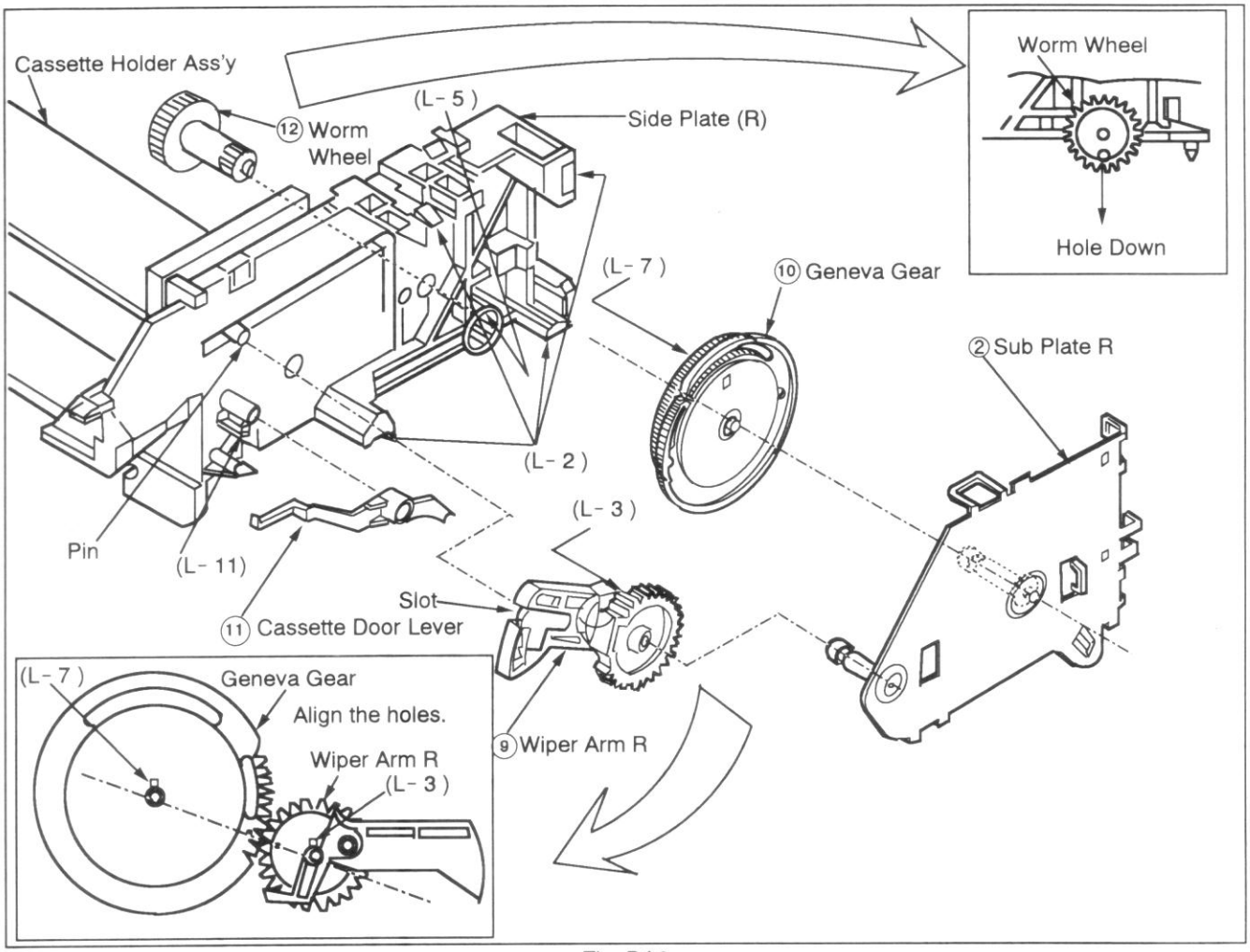


Fig. DA2

(Left Side)

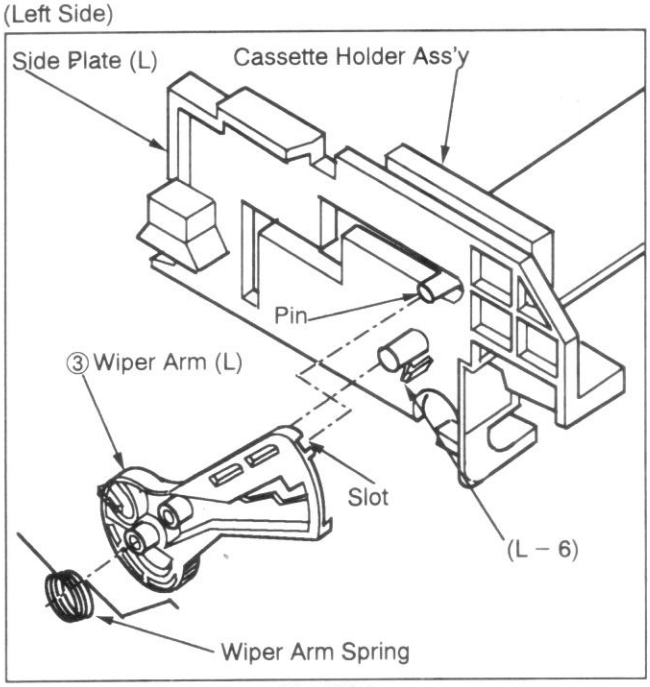


Fig. DA3

(Cassette Holder Ass'y)

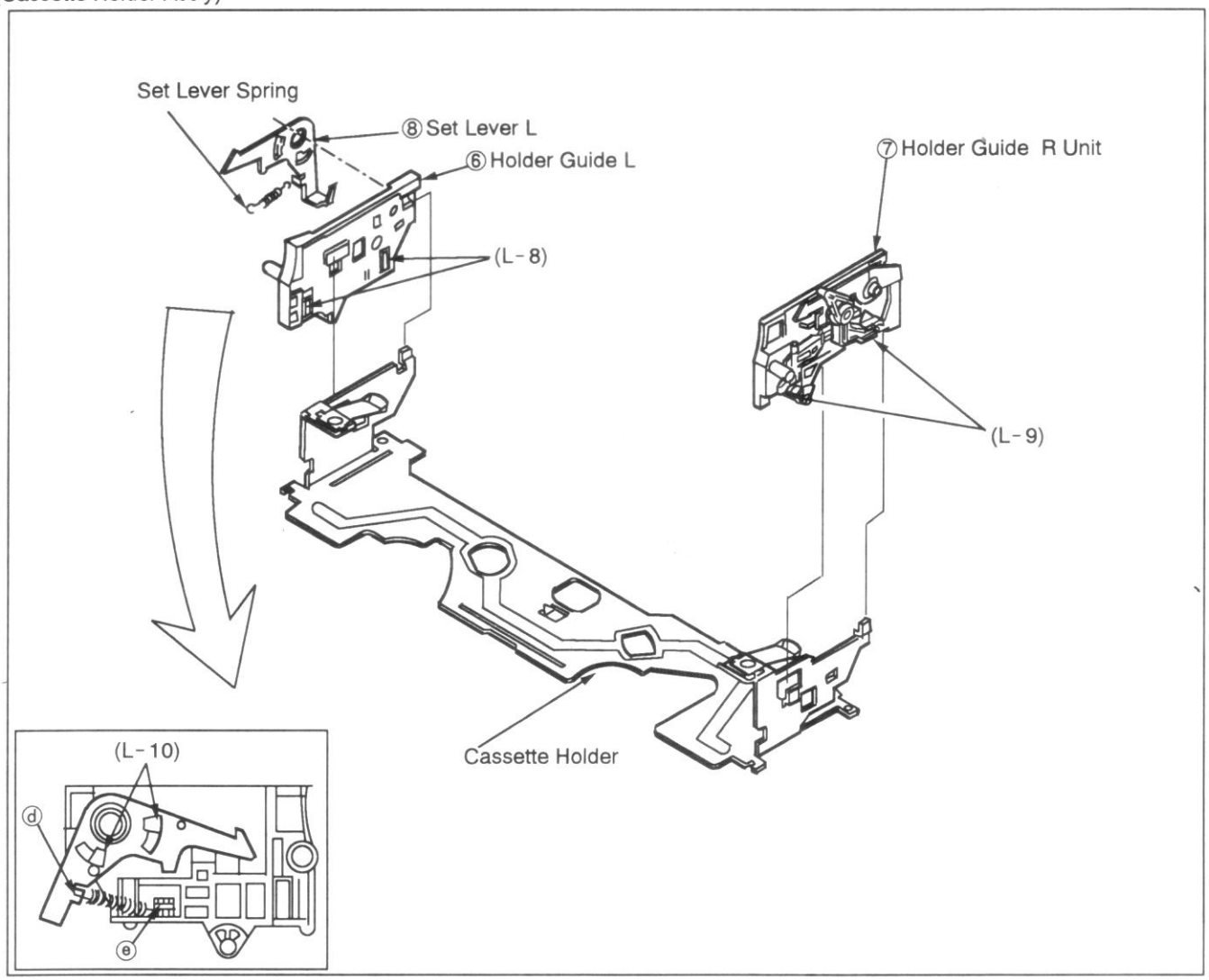


Fig. DA4

12. ADJUSTMENT OF CASSETTE UP UNIT AND CHASSIS

When reinstalling the Cassette Up Unit, mechanical adjustment (alignment) should be performed for proper operation as follows. And then, before reinstalling the Cassette Up Unit, ensure the hole on Wiper Arm - R- is aligned with hole on Geneva gear and ensure the Cassette Holder Ass'y is in Eject Position .

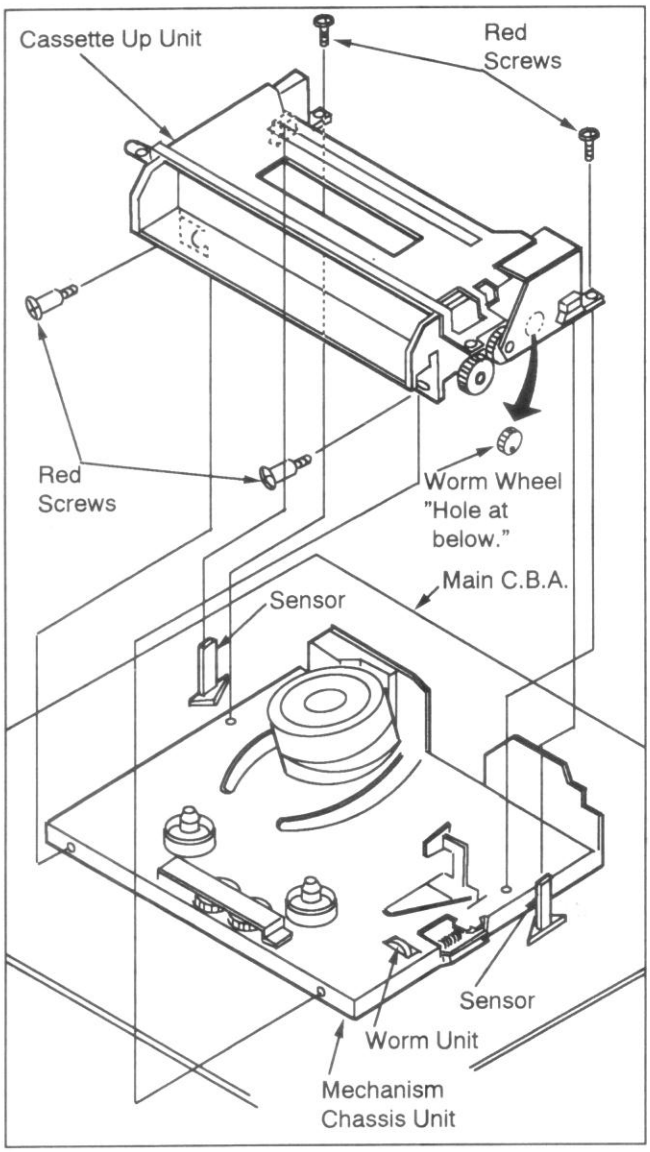
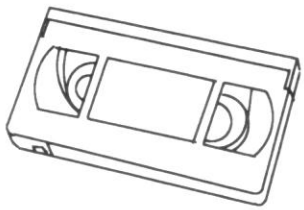
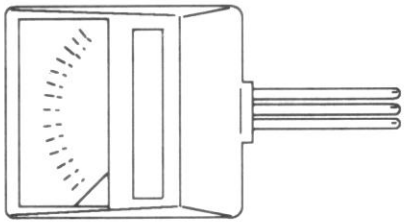
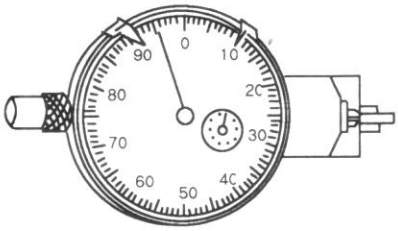
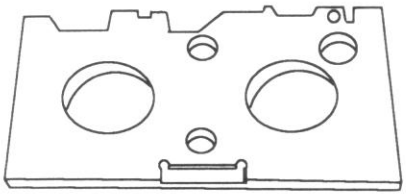
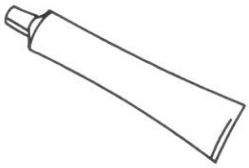
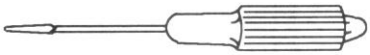
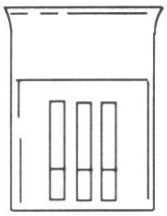
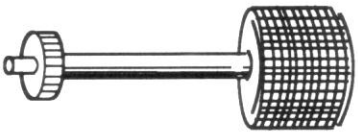


Fig. DA5

1. Turn the Worm Unit of Motor Block Ass'y clockwise then ensure Mechanism is placed fully into Eject position and maintain this position.
2. Slowly install the Cassette Up Unit onto the chassis so that worm wheel fits into the gear on Motor Block Ass'y.
3. Then confirm that the Sensors fits into the Sensor Covers properly .
4. Confirm that the hole of Worm Wheel is in the correct position.
5. Reinstall the 4 Red screw as shown in Fig. DA5.
6. Check the operation of the Cassette Loading Mechanism manually and confirm proper operation.

B. Service Fixtures & Tools

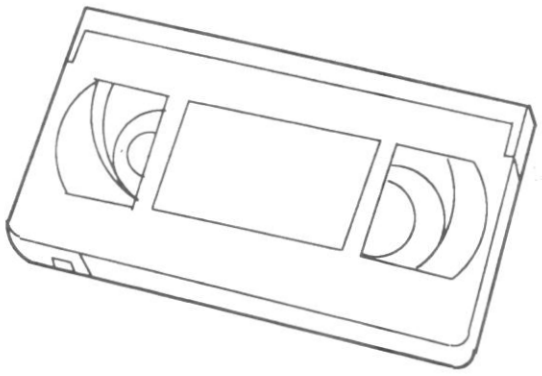
VFMS0001H6 VHS Alignment Tape 	Back Tension Meter (Made in U.S.A., Purchase Locally) 	VFKS0009 Reel Table Height Fixture 
VFKS0010 Post Adjustment Plate 	VFKS0021 Fine Adjustment Screwdriver	VFK0329 Post Adjustment Screwdriver
MOR265 Molytone Grease 	VFKS0031 V- Hold Adj. Tool 	VFKS0032 Lock Screw Wrench
VFK27 Head Cleaning Stick 	VFKS0080 H• Position Adj. Screwdriver 	VFKS0081 Grease

C. ELECTRICAL ADJUSTMENT PROCEDURES

1.TEST EQUIPMENT

To perform the electrical adjustments completely, the following equipment is required.

1. DVM (Digital Volt Meter)
   Voltage Range : 0.01 ~ 50V
2. Dual-Trace Oscilloscope
   Voltage Range : 0.001 ~ 50V/Div.
   Frequency Range : DC ~ 50MHz
   Probes : 10 : 1, 1 :1
3. Frequency Counter
   Frequency Range : 0 ~ 150KHz
4. Signal Generator
   Sinewave : 0 ~ 10MHz
6. AC Millivolt Meter
   Voltage Range : 0 ~ 1Vrms.
7. NTSC Video Pattern Generator
8. Color TV Receiver or Monitor
9. V-Hold ADJ. Tool (VFKS0031)
10. Plastic Tip Driver and Non-Metal Driver
11. Lock Screw Wrench (VFKS0032)
12. Isolation Transformer (Variable)
13. White Pattern Generator
14. White Balance Meter
15. VHS Alignment Tape (VFMS0001H6)



Start Counter Reading	0 (0)	0020 ± 8 (008 ± 6)	0135 ± 12 (060 ± 6)	0240 ± 20 (109 ± 10)
Video	Blank	Monoscope	Color Bars	Multi-Burst
Audio	Blank	6kHz(MONO)	3kHz(STEREO)	1kHz(MONO)

Fig. E1

2. HOW TO READ THE ADJUSTMENT PROCEDURES

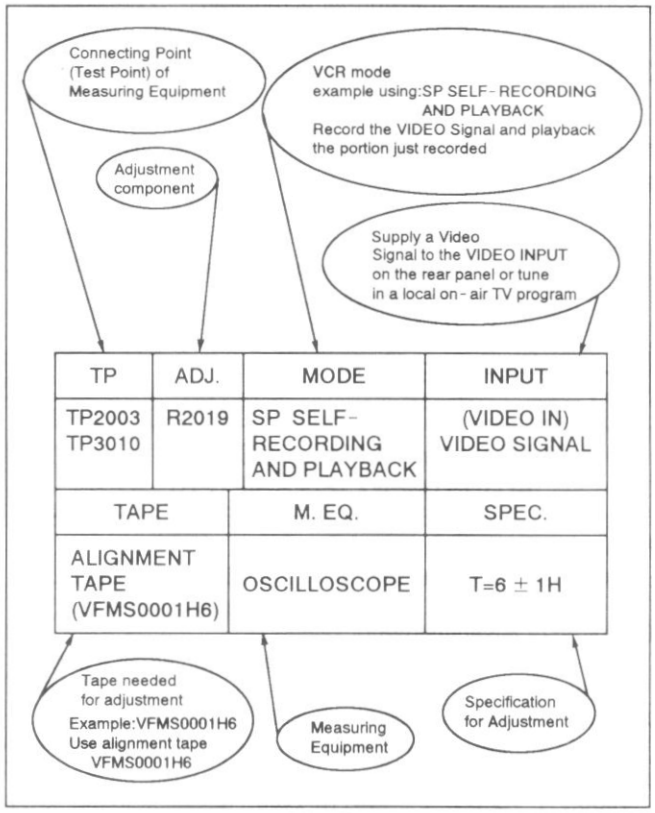


Fig. E2

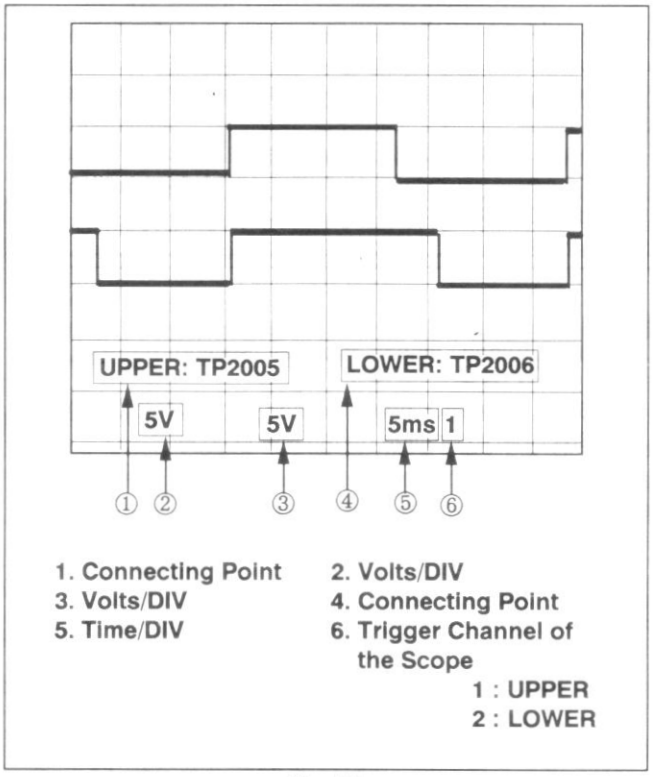


Fig. E3

Caution : Use an Isolation Transformer (Variable)

Because a Hot Chassis Ground is present in the Power Supply Circuit, an Isolation Transformer must be used. Also, in order to have the ability to increase the input voltage slowly, when troubleshooting this type Power Supply Circuit, a variable isolation transformer is required.

3. ADJUSTMENT PROCEDURES

These adjustment procedures consist of the following sections.

1. Servo Section
2. Luminance and Chrominance Section
3. TV Demodulator Section
4. TV Main & CRT Section

3-1. SERVO SECTION

3-1-1. HEAD SWITCHING POSITION ADJUSTMENT (PG SHIFTER)

Purpose:
Determine the Head Switching Point during Playback.

Symptom of Misadjustment:
May cause Head Switching Noise and/or Vertical Jitter in the picture.

TP	ADJ.	MODE	INPUT
TP3001 TP6205	R6201	SP PLAY	
TAPE		M. EQ.	SPEC.
ALIGNMENT TAPE (VFMS0001H6) COLOR BARS		OSCILLOSCOPE	T=6 ± 1H (0.38 ± 0.06msec)

Note:
TP3001 :Video Signal Process Section on the Main C.B.A.
TP6205 : System Control Section on the Main C.B.A.
R6201 : Servo Section on the Main C.B.A.

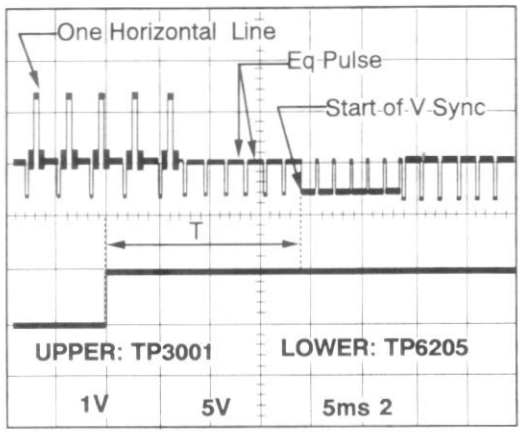


Fig. E4

3-2. LUMINANCE AND CHROMINANCE SECTION

3-2-1. LOW FREQUENCY NOISE CANCELLER ADJUSTMENT(LINE NOISE CANCELLER)

Purpose:
Improve the overall S/N Ratio especially in the Low Frequency Component.

Symptom of Misadjustment:
The S/N Ratio will be lower.

TP	ADJ.	MODE	INPUT
TP3007 TP3008	R3044	SLP SELF-RECORDING AND PLAYBACK	(VIDEO IN) NTSC COLOR BAR (W/WHITE WINDOW)
TAPE	M. EQ.		SPEC.
BLANK TAPE	OSCILLOSCOPE NTSC VIDEO PATTERN GENERATOR		Refer to Fig. E5

Note:
TP3007, TP3008, R3044 : Video Signal Process Section on the Main C.B.A.

1. Insert a Cassette Tape and record the NTSC Color Bar Signal in SLP Mode.
2. Set oscilloscope to the CHOP Mode.
3. Adjust the LINE NOISE CANCELLER(R3044) so that the A level at TP3007 and TP3008 are equal.

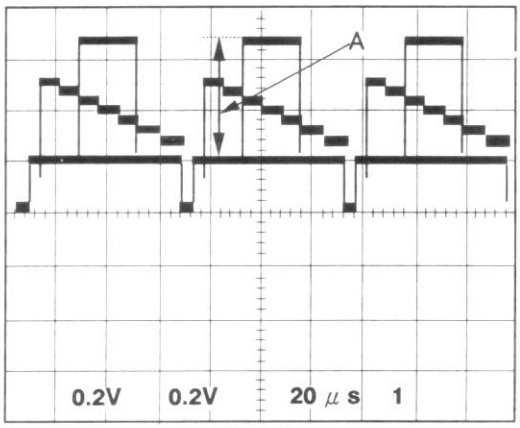


Fig. E5

3-3. TV DEMODULATOR SECTION

(CAUTION)

Since the UHF/VHF Tuner/TV Demodulator ASS'Y has already been adjusted at the factory, do not try to adjust unless absolutely necessary.

3-3-1. FIELD ADJUSTMENT

A. VCO ADJUSTMENT

A-1. VCO ADJUSTMENT

Purpose:

To adjust the Frequency of the Tank Circuit to 45.75MHz, which is used for the synchronous detection circuit.

Symptom of Misadjustment:

If the Detection Circuit deviates from 45.75MHz excessively, the picture will either have a beat or smear and in some cases it may disappear.

Tune in any Local Broadcast, then adjust T703 while watching the TV Monitor Screen as follows:

1. Turn T703 in both directions, right and left, far enough to find the point where Noise Bands or Beats appear on the TV Screen.
2. After finding those points in both directions, adjust T703 so that it is exactly half-way between those two points.
3. After the above adjustment, tune in another Local Broadcast. Then confirm that no Noise Bands or Beats appear on the TV Screen.

B. AFT TANK ADJUSTMENT

Purpose:

To align the Center Frequency of AFT with the picture IF carrier when the Center Frequency is shifted in the AFT Mode.

Symptom of Misadjustment:

Any slight Frequency shift in the AFT Transformer will cause either a Beat or Smear to appear in the picture.

1. Connect the Foil Solder Pad for the AFT Switch control point shown below to GND in order to turn the AFT Switch OFF.
2. Connect a DC Voltmeter to the pin 16 of IC701.
3. Tune is any VHF low channel.
   (Channel change after turning the AFT Switch OFF is necessary.)
4. Adjust the T704 so that DC voltage is 2.2 (+0.4, − 0.7)V.

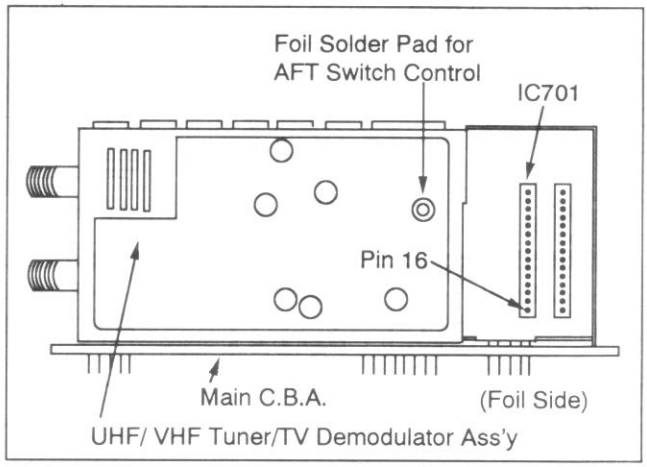


Fig. E6

C. SIF ADJUSTMENT

Purpose:

To extract the 4.5 MHz Audio Signal Component from the Audio IF Detection Circuit and into the Audio SIF Circuit.

Symptom of Misadjustment:

Buzz will occur in the audio.

1. Connect DC Voltmeter to Pin 17 of UHF/VHF Tuner/TV Demodulator, then tune in any Local Broadcast.
2. Read the voltage at Pin 17 of UHF/VHF Tuner/TV Demodulator.
3. Adjust T701 so that the voltage is 2.2 ± 0.5V.

D. BURST LEVEL ADJUSTMENT

Purpose:

Adjusts the Video IF Circuit to function properly and the Video Signal is sent out with stability as specified.

Symptom of Misadjustment:

If the Video Output Signal is more than the Specified Level, Beats will appear on the picture. Conversely, if the Video Output Signal is less than the specified level, the Chroma S/N Ratio will lower.

1. Tune in any Local Broadcast, then observe the Video Signal on the Oscilloscope using Pin 15 of UHF/VHF Tuner / TV Demodulator ASS'Y.
2. Then change the Channel to select the Channel with average p-p Level, Sync Level and Burst Level.
   (with Standard Channel, the p-p Level is 1.0 Vp-p and Sync Level is almost 28 % of Video Signal)
3. Confirm the worse burst level at Pin 15 of UHF/VHF Tuner /TV Demodulator.

4. Then adjust T1 so that the Burst Level is 80% of Sync Level.
5. After the above adjustment, tune in another Local Broadcast. Then confirm that there is not an absence of Color, and that no Beats appear on the TV Monitor.

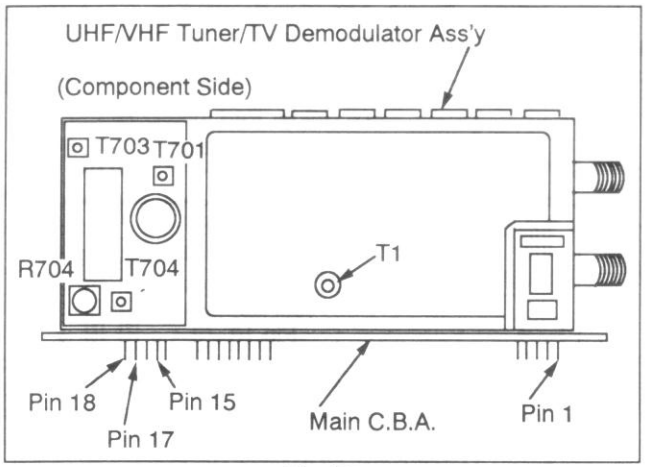


Fig. E7

E. RF AGC ADJUSTMENT

Purpose:
To determine the correct adjustment of RF AGC.

Symptom of Misadjustment:
If the AGC is activated at a point lower than 65dBμ, the Output Signal from the RF Amplifier will decrease, causing the S/N Ratio to become poor. If the AGC is activated at a point higher than 65dBμ, Cross Modulation will occur.

1. Tune in any Local Broadcast, then adjust R704 so that Noise or Beats appears on the TV Monitor Screen.
2. Turn R704 in the opposite direction and decrease Noise or Beats.
3. Adjust R704 at the point where Noise or Beats disappears.

3-4. TV MAIN & CRT SECTION

3-4-1. SUB CONTRAST ADJUSTMENT

Purpose :
To set the optimum Sub Contrast Level.

Symptom of Misadjustment :
The picture is too dark or too light.

TP	ADJ.	MODE	INPUT
TP13 TP50(GND)	R325	STOP	(VIDEO IN) CROSSHATCH PATTERN SIGNAL
TAPE	M. EQ.		SPEC.
	OSCILLOSCOPE NTSC VIDEO PATTERN GENERATOR		A = 2.6 ± 0.1Vp − p

Note :
TP50, : CRT C.B.A.
R325, TP13 : TV Main C.B.A.

(SETUP)
1. Controls
   Sub Color VR : Center
   Sub Tint VR : Center
   Sub Bright VR : Center
2. Switches
   Auto Color SW (Front) : Off
   Service SW (Rear) : N (Normal)

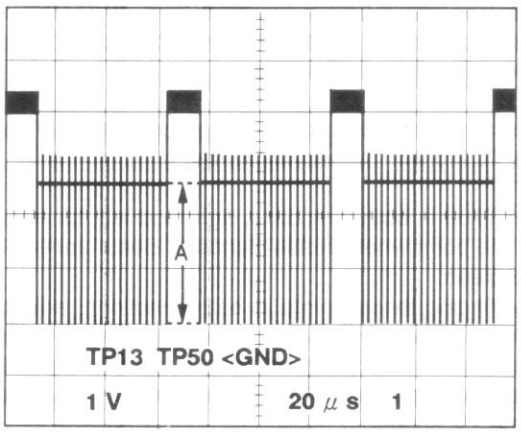


Fig. E8

Note :
If the Black Level exceeds the Pedestal Level, perform this adjustment after turning the Sub Bright (R324) so that the Black Level is lower than the Pedestal Level.

3-4-2. FOCUS, SCREEN, CUT OFF, DRIVE ADJUSTMENT

Purpose :
To set the optimum Focus and Screen.

Symptom of Misadjustment :
The picture is out of Focus and there will be an improper screen color mix.

TP	ADJ.	MODE	INPUT
	FOCUS CONTROL SCREEN CONTROL R365, R363, R369, R370, R371	STOP	(VIDEO IN) MONOSCOPE PATTERN SIGNAL

TAPE	M. EQ.	SPEC.
	NTSC VIDEO PATTERN GENERATOR	Refer to Descriptions below

Note :
Focus Control, Screen Control : Flyback Transformer
R363, R365, R369, R370, R371 : CRT C.B.A.

(SETUP)
1. Controls
R363 (DRIVE VR) : Center
R365 (DRIVE VR) : Counterclockwise 30 degrees from center on Component Side, refer to Fig. E9.
R369, R370,
R371 (CUT OFF VR): Center

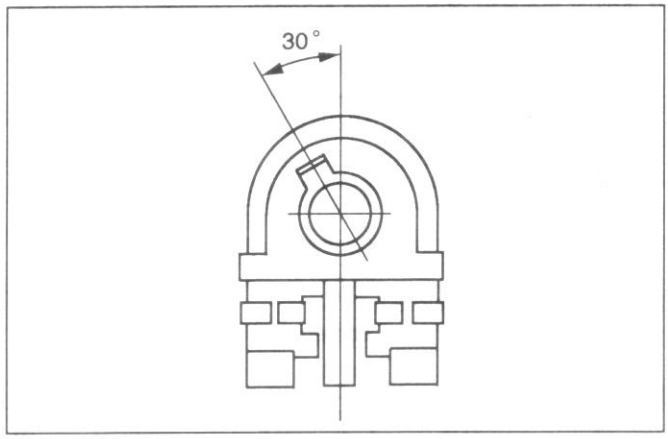


Fig. E9

1. Turn the Focus Control on Flyback Transformer to Sharpest Picture position.
2. Turn the Screen Control on Flyback Transformer fully counterclockwise.
3. Set the Service Switch on the Main C.B.A. to S (Service) Side.
4. Turn the Screen Control on Flyback Transformer clockwise carefully and stop at the point where any color is first observed.
5. Adjust the B - CUT OFF (R369) and the R - CUT OFF (R371) so that the Horizontal line is white.
6. Set the Service Switch on the Main C.B.A. to the N (Normal) Side.
7. Adjust R324(Sub Bright) so that the picture has adequate brightness.
8. Adjust the RED DRIVE (R365) and the BLUE DRIVE (R363) so that the contrast reaches its highest.

3-4-3. TINT/ SUB COLOR ADJUSTMENT

Purpose :
To set the standard color phase.

Symptom of Misadjustment :
Color phase will be shifted.

(Setup)
Sub Bright VR(R324) : Min.

TP	ADJ.	MODE	INPUT
TP46B	R622 R627	STOP	(VIDEO IN) RAINBOW COLOR BAR

TAPE	M. EQ.	SPEC.
	OSCILLOSCOPE NTSC VIDEO PATTERN GENERATOR	A : B = 1 : 1
		C=1000 ± 100mVp-p

Note :
TP46B, R622, R627 : TV Main C.B.A.

1. Turn the SUB TINT(R622) on the TV Main C.B.A. so that the waveform becomes A : B = 1 : 1.
2. Turn the Sub Color(R627) on the TV Main C.B.A. so that the Level C is 1000 ± 100mVp − p.

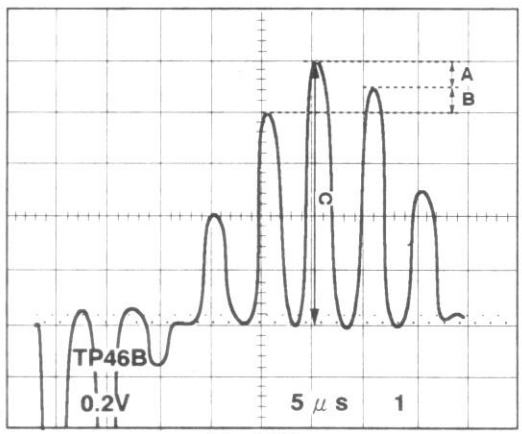


Fig. E10

3-4-4. PURITY ADJUSTMENT

Purpose :
To set the uniform brightness over the whole screen.

Symptom of Misadjustment :
The brightness on the screen will vary from area to area.

TP	ADJ.	MODE	INPUT
	Pair of 4-Pole Magnets, Pair of 6-Pole Magnets, Pair of Purity Magnets, Deflection Yoke	STOP	(VIDEO IN) CROSSHATCH PATTERN SIGNAL & WHITE PATTERN SIGNAL

TAPE	M. EQ.	SPEC.
	NTSC VIDEO PATTERN GENETATOR / WHITE PATTERN GENERATOR DEGAUSSING COIL	Refer to descriptions below

Note :
Pair of 4- Pole Magnets, Pair of 6- Pole Magnets, Pair of Purity Magnets, Deflection Yoke : CRT Unit

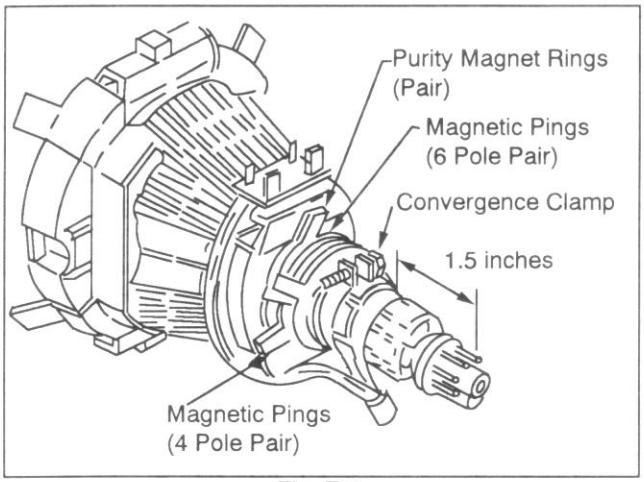


Fig. E11

1. Mount and secure Deflection Yoke so that the rear edge of expansion flange is 1.5 inches from the tips of the CRT pins as shown in Fig. E11.
2. Supply a signal cross or Crosshatch Pattern Signal.
3. Degauss the CRT by the Degaussing Coil.
4. Adjust the pair of 4 – Pole Magnets so that B and R at the center of CRT overlap each other.
5. Adjust the pair of 6 – Pole Magnets so that G overlaps B and R (in Step 4).
6. Supply the white pattern Signal.
7. Remove the wedges from the CRT.
   Loosen the expansion screw on the Deflection Yoke, and move the Deflection Yoke toward the CRT.
8. Turn the G CUT OFF (R370) to its end (CCW).
   Adjust the pair of Purity Magnets so that the Center Bar is at the horizontal centerline of the CRT and the V – Center Bar is at the vertical centerline of the CRT.
9. Turn the G CUT OFF (R370) so that the white pattern is obtained. Then move the Deflection Yoke back carefully (without rotating it), and stop it at the point where the whole screen is white. Tighten the expansion screw.

3-4-5. STATIC CENTRAL CONVERGENCE ADJUSTMENT

Purpose :
To set the uniform brightness over the whole screen.

Symptom of Misadjustment :
The brightness on the screen will vary from the center portion to the surrounding edges

TP	ADJ.	MODE	INPUT
	Pair of 4-Pole Magnets, Pair of 6-Pole Magnets	STOP	(VIDEO IN) CROSSHATCH PATTERN SIGNAL

TAPE	M. EQ.	SPEC.
	NTSC VIDEO PATTERN GENETATOR	Refer to descriptions below

Note :
Pair of 4 – Pole Magnets,
Pair of 6 – Pole Magnets : CRT Unit

1. Adjust the Pair of 4 – Pole Magnets so that B and R, at center of CRT overlap each other.
2. Adjust the Pair of 6 – Pole Magnets so that G overlap B and R (in Step 1).

3-4-6. DYNAMIC CONVERGENCE ADJUSTMENT

Purpose :
To set the uniform brightness over the whole screen.

Symptom of Misadjustment :
The brightness on the screen will vary from corner to corner.

TP	ADJ.	MODE	INPUT
	DEFLECTION YOKE	STOP	(VIDEO IN) CROSSHATCH PATTERN SIGNAL & WHITE PATTERN SIGNAL

TAPE	M. EQ.	SPEC.
	NTSC VIDEO PATTERN GENETATOR / WHITE PATTERN GENERATOR	Refer to descriptions below

Note :
Deflection Yoke : CRT Unit

1. Supply the Crosshatch Pattern Signal.
2. Hold Deflection Yoke at top and bottom, then wiggle front to back along longitudinal axis to correct Crosshatch Pattern position (Refer to Fig. E12).
3. Hold Deflection Yoke at left and right, then wiggle front to back along longitudinal axis to correct Crosshatch Pattern position (Refer to Fig. E13).
4. Insert three wedges at A, B and C positions to maintain the correct crosshatch pattern position.

(Confirmation of white)
1. Supply white Pattern Signal.
2. Confirm purity.
3. If the purity is not sufficient, the re-adjust of purity is necessary.
4. If the convergence error is more than 1.5mm from the green dot at each corner. Adjust the convergence at that corner wish a permalloy. Insert a permalloy into the gap between the DY and CRT along a diagonal line of a CRT funnel. And fix it at the best point of the corrected convergence. Use a permalloy piece at each corner only when the convergence is out of the specs at the corner.

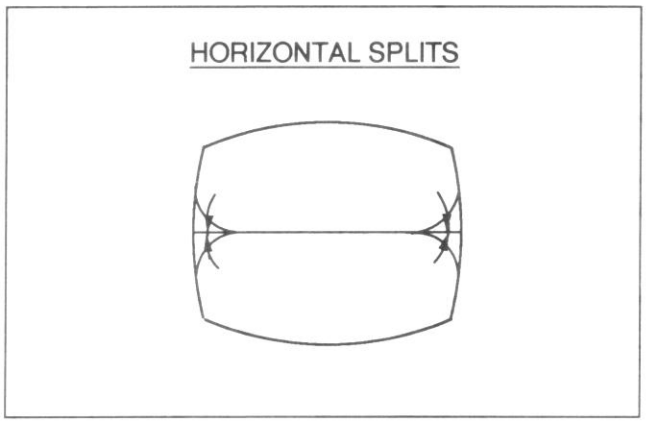


Fig. E12

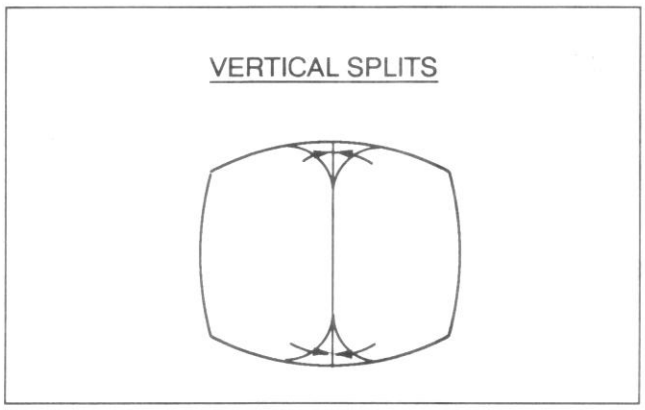


Fig. E13

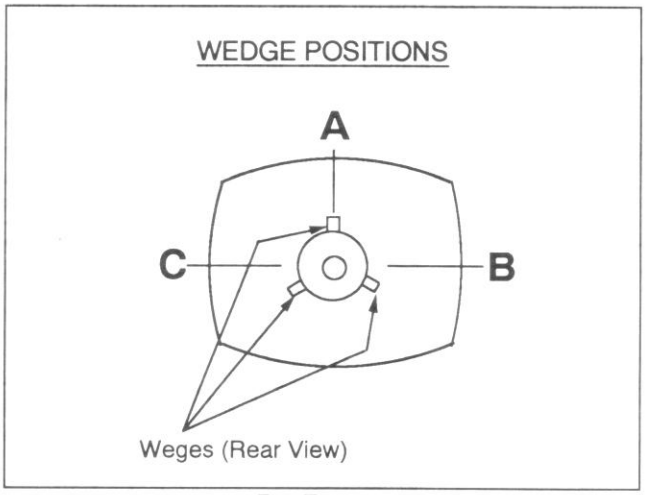


Fig. E14 – 1

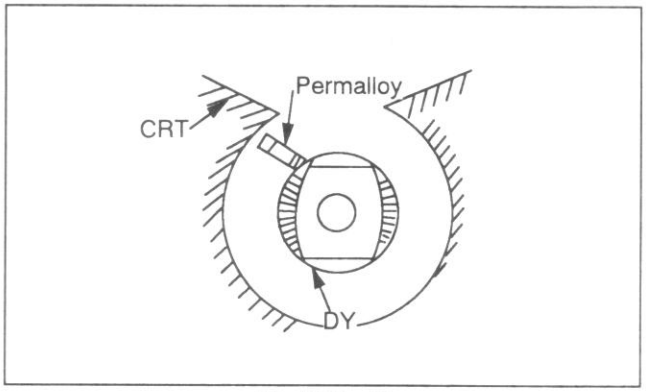


Fig. E14 – 2

3-4-7. VERTICAL SIZE ADJUSTMENT

Purpose :
To set the standard vertical picture size.

Symptom of Misadjustment :
The picture size is on the vertical axis is abnormal

TP	ADJ.	MODE	INPUT
	R410 , <JUMPER L (J92), JUMPER R(J91)>	STOP	(VIDEO IN) MONOSCOPE PATTERN SIGNAL

TAPE	M. EQ.	SPEC.
	NTSC VIDEO PATTERN GENETATOR / WHITE PATTERN GENERATOR	Refer to Fig. E15

Note :
R410, JUMPER L (J92), JUMPER R (J91): TV Main C.B.A.

1. Adjust the V-size (R410) so that position of upper center as shown in Fig. E15.
2. If the picture is shifted right and the small circles at corners do not keep a perfect circle inside the screen, cut the Jumper L(J92).
3. If the picture is shifted left and the small circles at corners do not keep a perfect circle inside the screen, cut the Jumper R(J91).

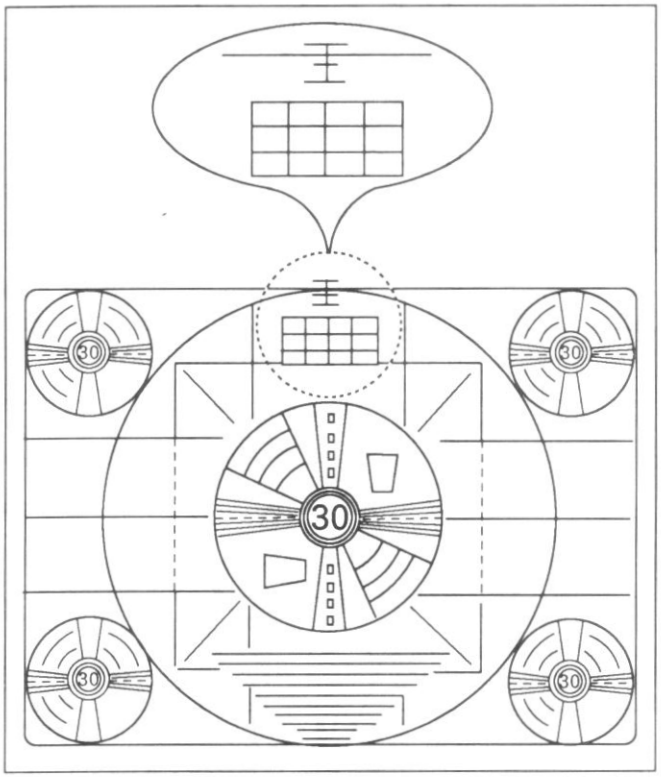


Fig. E15

3-4-8. WHITE BALANCE ADJUSTMENT

Purpose :
To set the standard white level for each color temperature.

Symptom of Misadjustment :
White becomes bluish or reddish.

TP	ADJ.	MODE	INPUT
	R363, R365, R371, R369	STOP	(VIDEO IN) LUMINANCE PATTERN SIGNAL
TAPE	M. EQ.		SPEC.
	NTSC VIDEO PATTERN GENERATOR WHITE BALANCE METER		Refer to descriptions below

Note :
R363, R365, R371, R369 : CRT C.B.A.

(SETUP)
1) Controls
Color VR (Front) : Min.
Tint VR (Front) : Center
Picture VR : Max.
Bright VR : Center
Sharpness : Center
2) Switch
Auto Color SW (Front) : OFF

1. Fix the photo sensor foot for "JUST FIT" to the CRT.
2. Set the SUB BRIGHT VR (R324) so that the White Balance Meter (High-Light White, G Meter) is 40 μ A.
3. Adjust R365 (R-DRIVE) and R363 (B-DRIVE) so that the White Balance Meter (both R & B Meters) is 0 μ A.
4. Set the SUB BRIGHT VR (R324) so that the White Balance Meter (Cut OFF White, G Meter) is 50 μ A.
5. Adjust R371 (R-CUT OFF) and R369 (B-CUT OFF) so that the White Balance Meter (both R & B Meter) is 0 μ A.
6. Repeat the above adjustment of 2. to 3. until both R and B read 0 μ A in the High-Light and Low-Light Modes.

3-4-9. SUB BRIGHT ADJUSTMENT

Purpose :
To set the optimum brightness level.

Symptom of Misadjustment :
The picture is too white or too black.

TP	ADJ.	MODE	INPUT
TPD1 (+) TPD2 (-)	R324	STOP	(VIDEO IN) CROSSHATCH PATTERN
TAPE	M. EQ.		SPEC.
	NTSC VIDEO PATTERN GENERATOR DVM (DIGITAL VOLT METER)		0.54 ± 0.02VDC

Note :
TPD1, TPD2, R324 : TV Main C.B.A.

(SETUP)
1) Controls
Picture VR (Front) : Max.
Bright VR (Front) : Detent
Sharpness VR (Front) : Detent
Color VR (Front) : Min.
2) Switch
Auto Color SW (Front) : OFF